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ATLAS

OF

CLINICAL SURGERY

WITH SPECIAL REFERENCE TO

DIAGNOSIS AND TREATMENT

FOR

PRACTITIONERS AND STUDENTS

BY

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ENGLISH ADAPTATION

BY

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With 150 Colored Figures

From Models by F. Kolbow in the Pathoplastic Institute of Berlin.

VOL. I

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Preface

Those who are acquainted with the history of medicine know that, even in ancient times, it was sought to represent pictures of diseases by the aid of plastic art. No wonder then that, at the present day, when medicine has made such great progress in all domains, we take advantage of all measures which may facilitate the study of morbid conditions. The rich material of *von Bergmann's* clinic, which has been placed at my disposal, renders it possible to give plastic representations of all surgical diseases which are suitable for reproduction in this way. The models were executed with the greatest skill by *F. Kolbow* in the pathoplastic institute at Berlin, and have proved of much value in the teaching of clinical surgery.

The models have been reproduced by the four-color process, which gives a more natural appearance than can be obtained in reproduction by water colors.

In this work clinical pictures have been represented with a view to assist the practitioner in diagnosis, and to give the student a survey of the more important surgical diseases. For this purpose, the malignant and benign tumors, a number of pyogenic, tuberculous and syphilitic conditions which are common in surgical practice have been figured and described, along with numerous other cases which belong to the domain of surgery.

In the text, which represents the teaching of *von Bergmann's* school, all cases described have been

under the author's observation. Diagnosis, differential diagnosis, prognosis and treatment are dealt with from the modern standpoint.

The author begs to acknowledge his indebtedness to his master, the late Professor *von Bergmann*, and thinks this can be expressed in no better way than by an endeavor to give a true exposition of his teaching, which will always remain a landmark in the science of surgery.

PH. BOCKENHEIMER.

Berlin.

Translator's Preface

With the exception of *Lister*, few surgeons have had more influence on the progress of surgical science than the late Professor *von Bergmann*. We are, therefore, much indebted to Professor *Bockenheimer* for placing before us the teaching of *von Bergmann's* school in a concise and practical form. The reproductions of *Kolbow's* models have been executed with remarkable skill, and give a most faithful and life-like representation of the various diseases.

In this English adaptation I have followed the original text pretty closely. I have added a few paragraphs in brackets where they appeared to be useful.

C. F. Marshall.

27 New Cavendish Street, London, W.

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Fig. 1. Carcinoma planum faciei.

Fig. 2. Carcinoma frontis.

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Cutaneous Carcinoma

CARCINOMA PLANUM FACIEI (*of the Face*)
Plate I, Fig. 1.
CARCINOMA FRONTIS (*of the Forehead*)
Plate I, Fig. 2.
CARCINOMA NASI (*of the Nose*)
Plate II, Fig. 4.

Cutaneous cancers of the face are of great importance because they constitute almost a tenth part of all cases of cancer (*Gurlt, Heimann*). The nose, eyelids, cheeks, temples and forehead come in the first line, while the chin and ears are least affected. In youth, these tumors very seldom occur, and then originate in various ways from the basis of a Xeroderma pigmentosum (*Kaposi*). From the fortieth to the seventieth year the disease is common and develops from pre-existing warts, cutaneous horns, adenomata, dermoid or atheromatous cysts (*H. Wolff*), as well as from diseases which cause chronic irritation of the skin (erysipelas, eczema, tuberculous and syphilitic ulceration).

In old country people the flat cutaneous carcinoma (Figs. 1 and 2) occurs very frequently, and can be traced to early wrinkling of the skin, uncleanliness and senile seborrhea, causing an accumulation of dirty scales on the skin. By scratching this epidermic accumulation, superficial easily bleeding sores are formed, which, however, heal quickly so long as they are not cancerous.

The Carcinoma planum faciei (*von Schuh's* "ulcus rodens") presents itself at first as a hard, flat, reddish nodule, which, when scratched or broken,

forms a flat ulcer with little tendency to heal. Of slow growth, and only attaining a conspicuous size after some years, it generally remains a long time unnoticed by the patient, especially as it causes no inconvenience. When it presents itself as a growing superficial ulceration, this generally has a circular form with hard, raised edges of overlapping thinned epidermis; while the floor of the ulcer is, for the most part, soft at first, and the whole growth is movable over the deeper structures.

In the region of the chin especially there is a resemblance to the syphilitic chancre or gumma, but the base of the cancerous ulcer is distinguished by manifold irregularities and fissures. Easily bleeding granulations alternate with more yellowish, fatty looking parts (Fig. 1). It is characteristic of these cutaneous carcinomata that plugs the size of a pin's head can be pressed from the yellow surface of the ulcer; microscopic examination shows that these consist of broken-down, fatty, cancer cells. The ulcer is often covered by a scab so that the diagnosis is only possible after its removal. As the tumor extends there appear radiating contractions of the surrounding skin and consequent deformity (of the eyelids, for example). The original circular shape is then often wanting, and the outline becomes irregular (Fig. 2). At first superficial, the tumor may after some years extend to the deeper parts and cause extensive destruction; for instance, of the bones of the face (Fig. 4). This deep extension is especially seen in parts where the subcutaneous fatty tissue is not developed (the temples, bridge of the nose and zygomatic arch, Figs. 2 and 4). The deep growth is evident at the commencement in the slight mobility of the tumor over the subjacent structures.

On account of the spontaneous cicatrization, which may take place at different parts of the ulcer or over its whole surface, although it is not perma-

nent, these growths were formerly wrongly placed in the group of benign tumors (cancroid). Their microscopic structure is in most cases that of squamous-celled, epithelial cancer, which by extension into the deep glandular regions may later on cause metastatic growths in the organs (*Virchow*).

Differential Diagnosis. Carcinoma is distinguished from papilloma or adenoma by its hard edges and the characters mentioned above.

Treatment. Transient epidermization can generally be quickly obtained in small flat cutaneous carcinomas by aseptic and antiseptic dressings. A permanent healing is, however, not to be obtained in carcinoma by this means, nor by caustic pastes (Vienna paste, etc.), nor by treatment with X-rays or radium. Such healing is only deceptive, for the cancer extends deeply and gives rise to metastases; hence the only rational treatment of cancerous ulcers is early excision about one centimeter beyond the edge of the ulcer in the healthy tissue, and of sufficient depth. Infiltration anæsthesia should not be employed, for it obscures the limits of the tumor. Diseased glands, which can be recognized as small hard lumps, should always be removed.

In excision no regard must be paid to adjacent parts (*e.g.* eyelids). The defect can be remedied by plastic surgery, especially by *Dieffenbach's* methods. Recurrence seldom takes place in carcinoma planum after early excision.

Fig. 1. Shows a flat cutaneous cancer in a typical situation on the face; still clear of the subjacent tissues. Cured by excision, and repair of the defect by a pedunculated flap from the left part of the forehead. The defect in the forehead was repaired by *Thiersch's* grafts.

Fig. 2. Advanced carcinoma of the skin with

irregular borders. The growth has already extended to the bones. The upper eyelid and the ocular conjunctiva are also involved. This is a case of the rare form of cancer of the skin first described by *von Bergmann*, which in its early stages appears in the form of small multiple nodules and may therefore be mistaken and treated for tuberculosis cutis (lupus). The raised, irregular, hard edges of the ulcer point to the correct diagnosis, which in doubtful cases should be cleared up by removal of a piece for examination. Previous treatment by the X-rays had caused a rapid extension of the carcinoma, so that the patient, on account of the very advanced local disease and the severe cachexia from organic metastases, came to the clinic in an inoperable condition. Treatment of inoperable carcinoma: Antiseptic dressings with potassium permanganate and peroxide of hydrogen; later on, cauterization.

Fig. 4. Cutaneous cancer with extensive deep growth. Destruction of the nose, both of the bony framework and of the ethmoid cells. This form of cancer in its early stage consists of subcutaneous nodules covered by unaltered skin. The skin gives way when the nodules break down and a very extensive and deep cancerous ulcer results. This may be mistaken for a gumma, but the latter is not so ragged and has a yellow core. (Cf. Fig. 120.) The presence of epithelial plugs is also characteristic of this form of carcinoma. Microscopical examination and antisyphilitic treatment with iodide of potassium will decide the diagnosis in doubtful cases. The papillomatous forms (Fig. 4) which often give rise to deep cutaneous cancer, through their rapid growth and metastatic formations, must be regarded as extremely malignant tumors.

The permanent results are generally favorable after extensive operations, which often involve removal of diseased bones (*v. Bramann, Grosse*). When carcinoma of the face extends through the

dura mater, operation is not indicated, and the case must be treated according to the rules for inoperable cancer. In all extensive carcinomas of the face the patients may die from septic pneumonia when the destructive process reaches the buccal cavity.

A special form of cancer arising in the deep parts of the corium as cancerous nodules constitutes what *Krompecher* described as basal-celled cancers. According to *Coenen* these are not to be classed with endotheliomas, as formerly, for they arise from the basal cells of the sweat and sebaceous gland epithelium, or from the epithelium of the hair follicles. In distinction to the other cutaneous cancers they do not become cornified, and were, therefore, classed by *Borst* among the endotheliomas.

Multiple carcinomas of the face have been noted by several observers (*v. Bergmann, Coenen, Schimmelbusch*). *Von Bergmann*, in a case of carcinoma of the forehead, which after some years was followed by another in the floor of the mouth, was of opinion that these were separate, independent carcinomas, because metastases in the tongue and floor of the mouth are very rare, and there was a long time between the development of the two carcinomas.

Carcinoma of the Mucous Membranes

CARCINOMA LABII INFERIORIS (*of lower Lip*)
Plate II, Fig. 3.
TUBERCULOSIS CUTIS (*of the Skin*)
Plate III, Fig. 5.
PAPILLOMA LINGUAE (*of Tongue*)
Plate IV, Fig. 6.
CARCINOMA ET PAPILLOMA LINGUAE (*of Tongue*)
Plate IV, Fig. 7.
CARCINOMA LINGUAE INCIPIENS
(*Incipient Carcinoma of Tongue*)
Plate IV, Fig. 8.
CARCINOMA LINGUAE EXULCERATUM
(*Ulcerating Carcinoma of Tongue*)
LEUKOPLAKIA (*Leukoplakia*)
Plate IV, Fig. 9.

Cancers of the lips resemble cancers of the skin in their form and structure, for they are squamous-celled epitheliomas, and tend to cornification. They arise in the form of cauliflower-shaped, polypoid tumors on the mucous membrane of the lips, cheeks, and glans penis, or as deep ragged ulcers (lips and tongue), and appear in these principal forms in all mucous membranes covered with squamous epithelium. Carcinoma of the upper lip is very rare, but *v. Bergmann* has observed a case where a carcinoma of the upper lip developed within a few weeks after a cancer of the lower lip, in a symmetrical position. Carcinomas of the lower lip form 45.6 per cent. of all cancers of the face, nearly all occurring in the male sex. The action of tobacco must play a special rôle in the origin of cancer of the lip,

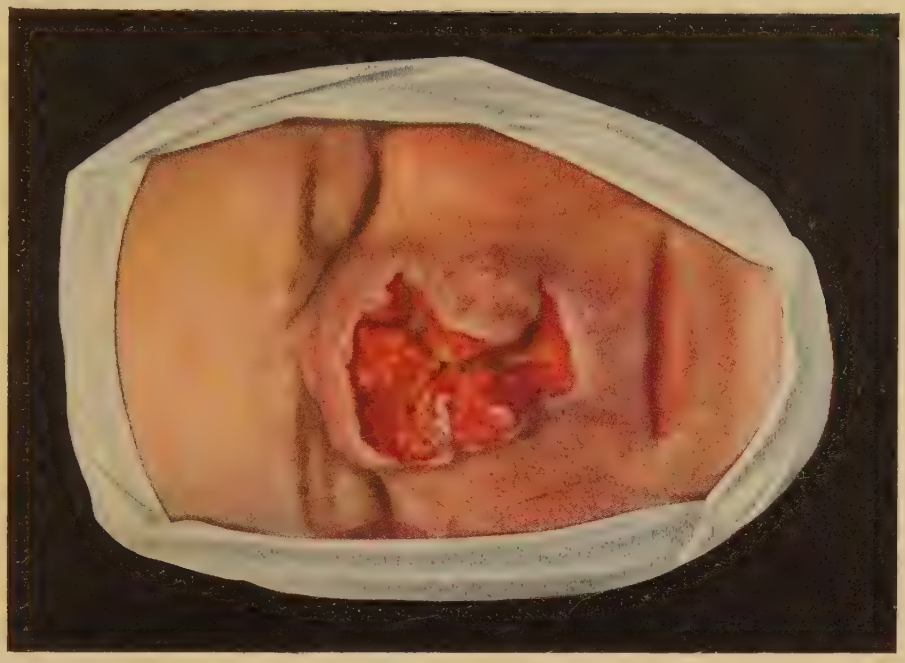

Fig. 4. Carcinoma nasi.

Fig. 3. Carcinoma labii inferioris.

for the patients, of both sexes, are mostly great smokers.

Cancer of the lower lip often begins at the junction of the skin with the red part of the lip, generally between the center of the lip and the angle of the mouth, as a small, hard nodule at first covered by mucous membrane. The mucous membrane soon becomes broken and the nodule grows, infiltrating the surrounding tissues rapidly, while the mucous membrane breaks down more and more and forms an ulcer. Antecedent diseases of the mucous membrane, such as tuberculosis and psoriasis (*leukoplakia*) appear to predispose to carcinoma. The whole of the lower lip may be gradually destroyed (Fig. 3). Scabs and crusts form at several places on the ulcer, and when separated give rise to bleeding. While in its early stages the cancerous ulcer is recognized by its hard, raised edges and crateriform floor, the advanced cancer of the lip shows papillomatous proliferations springing from the floor of the ulcer (Fig. 3). The more the carcinoma extends, the more it implicates the underlying bones and the mucous membrane of the cheeks and floor of the mouth, so that the bones and the buccal mucous membrane may be completely destroyed. The exudation of growing cancer of the lip gives rise to much cachexia, gastritis and enteritis, and the secretion may reach the lungs and cause death from septic pneumonia. In such inoperable forms the submaxillary and submental regions are usually filled with hard, fixed glands.

Differential Diagnosis. Although these advanced forms, which are often neglected, especially in country people, are unmistakable, there may be difficulty in the diagnosis of the early stage of the cancerous ulcer. The irregular, ragged surface of the carcinoma is in marked contrast to the smooth surface of primary syphilis, and the comedo-like

epithelial plugs which are characteristic of all squamous-celled epitheliomas can be extruded from it by pressure. The glands are affected very early in carcinoma, first in the submental region, and are usually, small, very hard and isolated, in contrast to the multiple glands in primary syphilis, which are not so hard and mostly situated at the bifurcation of the carotid.

Isolated tuberculosis, or an ulcer extending from tuberculosis of the buccal mucous membrane or tongue, is very rare on the lip. It has irregular edges which are not so raised and hard as those of cancer. The surface of the ulcer, which results from the breaking down of small tubercles, is of a reddish-gray color and bleeds very easily. It is usually covered with a single large scab. No plugs can be expressed from it. Glandular enlargement is soft and isolated.

Ulcerated cavernoma (cavernous angioma) of the lip may have a cancerous appearance, but it usually occurs in children and is generally associated with other anomalies of the blood-vessels.

The induration of fissures of the lips resulting from chronic eczema heals quickly under rational treatment, and is thus distinguished from carcinomatous induration.

It is important to note that cancer of the lip occurs not only in old people but also soon after the thirtieth year.

Treatment. All depends on early diagnosis, for the cuneiform excision of small tumors gives the best chance of a radical cure. In doubtful cases excision is to be preferred to antisyphilitic or antituberculous treatment, so as to lose no time. In extensive growths, from one and one half to two centimeters of healthy tissue should be removed round the tumors, and the neighboring parts suspected of disease, such as bones and buccal mucous membrane, should also

Fig. 5. Carcinoma labii inferioris — Tuberculosis cutis.

be removed. The defect can be repaired by plastic operations, the best of which are *Dieffenbach's* or *Jaesche's*.

Palpable glands should always be removed by separate incisions in the submental and submaxillary regions. The submaxillary gland which is often affected is best removed at the same time. By radical operation a permanent cure is possible even in extensive carcinomas.

Fig. 3 shows a carcinoma involving the whole lower lip. Deep ulcerations alternate with papillomatous outgrowths. In some parts there are scabs on the surface of the ulcers, in others isolated yellow epithelial plugs. The growth is hardly movable over the lower jaw, and is on the point of extending to the buccal mucous membrane. After free excision of the tumor, removal of the enlarged glands in the submental and submaxillary regions, the extensive defect was repaired by double cheiloplasty (*Dieffenbach's* operation) and a cure was obtained.

Fig. 5 represents a large cancerous ulcer, originating from tuberculosis of the skin, involving half the lower lip. The hard, raised edges of the ulcer divested of mucous membrane are characteristic. The floor of the ulcer is irregular and ragged and beset with yellowish epithelial plugs. Cancerous ulcers arising on the basis of tuberculosis of the skin have a great tendency to bleed. In contrast to the forms of hypertrophic lupus, which gives rise to soft, fungoid, slow-growing tumors, the hardness and rapid growth of the lupus-carcinoma is characteristic. Excision of the carcinoma, removal of the glands, and repair of the defect by *Dieffenbach's* cheiloplasty led to a cure.

Fig. 5 also shows a characteristic picture of different forms of cutaneous tuberculosis; lupus of the face. The disease appears most frequently in this situation and usually begins on the nose (tuberculosis

of the nasal mucosa), and extends over the face in the form of a butterfly. The sharp, irregular outline on the forehead, neck, and behind the ears is characteristic. The disease begins with small reddish-brown nodules situated in the cutis giving rise to exfoliation of the epidermis (lupus exfoliativa); these become confluent and form flat, reddish-gray, easily bleeding ulcers (lupus exulcerans, which after healing leave radiating cicatrices, often after considerable destruction of tissue. (Fig. 5, ear.) After a time papillomatous proliferations may arise of soft and spongy consistence, especially about the ear (lupus hypertrophicus). These three forms are usually present in the same patient (*v. Bergmann*).

Treatment. In circumscribed forms excision of the skin with the diseased subcutaneous tissue is indicated, with repair of the defect by skin flaps. The diffuse forms are treated in *v. Bergmann's* clinic by the sharp spoon (*Volkmann*). The diseased parts are scraped and the bleeding surface treated with *Pacquelin's* cautery or with hot air. Many sittings are often necessary in order to arrest the disease, and the patients often succumb from tuberculous disease of the internal organs, or relapsing facial erysipelas.

Cancer of the buccal cavity occurs on the tongue, the floor of the mouth and the cheek. Cancer of the tongue (Figs. 7, 8 and 9) occurs almost exclusively in man (after the fortieth year), owing to the action of tobacco and alcohol. Antecedent lingual or buccal leucoplakia predisposes to buccal carcinoma; *v. Bergmann* finds it present in fifty per cent. of his cases of cancer of the tongue. Leucoplakia forms hard, white, opaline patches raised above the surface of the mucous membrane of the tongue, consisting of horny epithelium (hyperkeratosis). The surface, at first smooth, after a time becomes fissured, especially after excessive smoking, and the patches of leuco-

Fig. 6. Papilloma linguae.

Fig. 7. Carcinoma et Papilloma linguae.

Fig. 8. Carcinoma linguae incipiens.

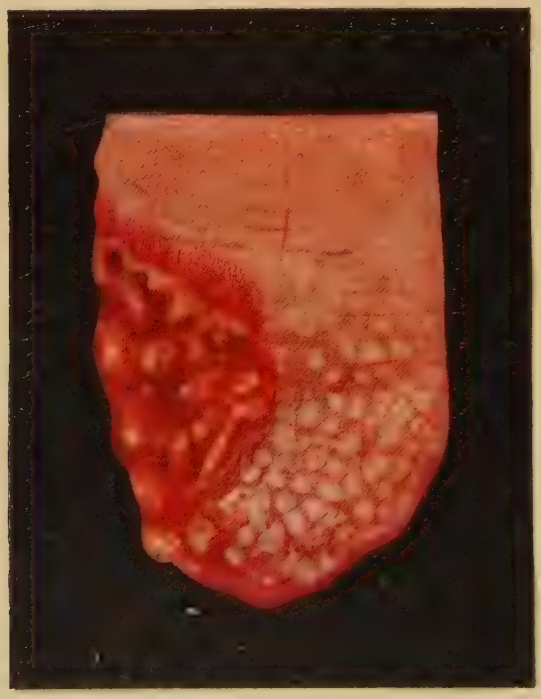

Fig. 9. Carcinoma linguae exulceratum. Leukoplakia.

plakia become clearly visible and at the same time take on deeper growth. Since carcinoma arises directly from these fissured patches of leucoplakia, which have absolutely nothing to do with syphilis,* removal of such large and fissured nodules should always be performed, especially as multiple carcinomas of the buccal cavity have been observed under them. Microscopically, the direct transition from hyperkeratosis to carcinoma has not yet been conclusively demonstrated.

Besides leucoplakia, jagged carious molar teeth also act as exciting causes of cancer of the tongue, which explains the almost exclusive occurrence of cancer in the posterior part of the side of the tongue.

The carcinoma appears in two forms, according as it arises from the superficial mucous membrane or from the glandular epithelium.

The first form resembles the flat cutaneous carcinoma and soon gives rise to a small ulcer with hard, raised edges (Fig. 7, right half) the fissured surface of which has a yellowish or dirty-brown appearance. Although the carcinoma is only superficial, the submaxillary glands are soon affected, owing to the abundant lymphatics of the tongue (*Kuttner*).

The deep carcinomas form hard nodules over which the mucous membrane remains intact for a long time. After breaking down of the nodules and destruction of the mucous membrane, an extensive crateriform ulcer is formed with hard, irregular edges and deep fissures in the center. This often extends as far back as the epiglottis. Numerous epithelial plugs can be expressed from the floor of the ulcer, and often from the papillomatous proliferations.

*Translator's Note—This statement is not in accordance with the teaching of Fournier and the majority of syphilologists, who regard buccal leucoplakia as almost exclusively of syphilitic origin. According to Fournier, cancer of the tongue is due to the combined effect of syphilis and tobacco. (See Fournier's Treatment and Prophylaxis of Syphilis, Rebman Company, New York.)

The patients suffer great pain from the irritation of free nerve-endings in the floor of the ichorous ulcer, and, in untreated cases, succumb usually within a year from glandular metastases extending along the carotid to the supra-clavicular region (Fig. 9). Early diagnosis is, therefore, of the greatest possible importance.

Differential Diagnosis. The superficial carcinoma (Fig. 7) is recognized by the characteristic features of flat cutaneous carcinoma and differs from syphilitic chancre by its sharp, hard edges, the irregular floor of the ulcer with epithelial plugs, and the small, hard glands. As long as the flat carcinoma of the tongue is covered with mucous membrane it may in its earliest stages be confounded with papilloma (Fig. 6), especially in the rare cases where it lies more in the center of the dorsal surface of the tongue. Papillomas, however, generally appear as multiple, soft elevations the size of a pin's head, so that the surface of the tongue may appear furnished with small points, or may assume a lobulated form; or there may be fungiform sessile tumors, like stalactites, which often form high projections and have a warty appearance (Fig. 7). That a flat carcinoma and a papilloma of this kind may occur independently without microscopic transition into each other is shown by *v. Bergmann's* case ("Handbook of Practical Surgery, III edition: Text-book of Surgery, II edition"). Small papillomata cause the patient hardly any inconvenience and can be removed with the sharp spoon or *Pacquelin's* cautery. Larger papillomata should be excised (Fig. 7, left half).

The diagnosis is difficult when, as in Fig. 8, a hard, carcinomatous nodule develops under a patch of leucoplakia. The irregular, deep, hard infiltration and the rapid growth point to a commencing new growth, which should always be removed before it

breaks through, especially when there is leucoplakia over the nodule.

Abscesses of the tongue, which result from injury by foreign bodies (steel pens, etc.), and form hard nodules in the substance of the tongue, are characterized by the early painfulness on pressure. Actinomycosis causes a more diffuse, wooden infiltration of the whole tongue and very soon interferes with its motion. (Abscess is treated by incision and actinomycosis by incision and scraping).

The small carcinomatous ulcer of the edge of the tongue is liable to be confounded with ulcerations caused by the irritation of broken teeth (dental ulcers), especially when it is situated opposite a sharp tooth; however, the cancerous ulcer continues to grow after removal of the offending tooth. Larger ulcerations which result from the breaking down of deep carcinoma may be confounded with gumma on superficial examination. The latter, however, is almost always situated in the center of the tongue or in its anterior part, and has the characteristic dirty-yellow, gummatous core, which can be removed without bleeding (Fig. 119), in distinction to the easily bleeding reddish-brown proliferations of carcinoma. Moreover, the pain radiating to the ear which is constantly present in large carcinomas, is absent in gumma; also the glandular metastases and the leucoplakia.

The clinical picture of carcinoma is, therefore, so clear that antisyphilitic treatment for the purpose of diagnosis is not necessary. Excision for diagnosis, which is often inconclusive, is also to be disregarded (*v. Bergmann*). In cases where the diagnosis hesitates between carcinoma and the rarely occurring isolated tuberculosis, or between the still rarer sarcoma which is observed in young people at the tip of the tongue, complete excision should always be performed.

Treatment. Small carcinomas can be excised and the wound closed, after compression of the tongue by a ligature. Excision by *Pacquelin's* cautery and subsequent plugging may also be done.

For large carcinoma a radical operation by section of the lower jaw is necessary (according to *Sédillot* and *Kocher* in the middle line; according to *v. Bergmann* and *Langenbeck*, laterally) with subsequent ligation of the lingual artery (cf. *Bockenheimer & Frohse's* "Atlas of Typical Operations").* By this means not only can the tumor of the tongue be excised through healthy tissues as far as the epiglottis, but also the masses of glands which extend from the submaxillary region to the ear can be removed. Even after extirpation of extensive portions of the tongue the patients, after a few months, can make themselves well understood. Permanent cures, are however, unfortunately rare, even after radical operations, in progressive cases of cancer of the tongue, especially when the lower jaw is involved and the glands have become fixed, so that some surgeons content themselves with the local treatment of carcinoma by caustics and cauterization.

The treatment of cancer of the buccal cavity, which often arises on the basis of leucoplakia, in the same form and with the same symptoms, is carried out on the same principles.

Fig. 6 represents a flat papilloma of the tongue which was removed with the sharp spoon.

Fig. 7 shows on the right half of the tongue a superficially ulcerated carcinoma, while on the left half of the tongue there is an extensive papilloma. Both growths were removed by excision.

Fig. 8 shows a deep carcinoma developing under a patch of leucoplakia; it is not yet ulcerated and is characterized by its hardness and irregular outline. This is exceptional in the center of the tongue. The

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growth was removed by excision and subsequent suture.

Fig. 9 represents the most common form of cancer of the tongue; a carcinomatous ulcer of the side of the tongue with extensive destruction, leucoplakia and glandular metastases. After section of the lower jaw the growth was widely removed, the stump of the tongue sutured and the glands removed from the neck.

Glandular Carcinoma

CARCINOMA MAMMAE (*of Breast*)
LYMPHOMATA CARCINOMATOSA (*Carcinomatous*)
Plate V, Fig. 10.
CARCINOMA MAMMAE EXULCERATUM
(*Ulcerating Carcinoma of Breast*)
Plate VI, Fig. 11.
CARCINOMA MAMMILLAE (*of Nipple*)
Plate VII, Fig. 12.
CARCINOMA MAMMAE (*of Breast*)—**PAGET'S DISEASE—ECZEMA CHRONICUM MAMMILLAE**
(*Chronic Eczema of Nipple*)
Plate VIII, Fig. 13.
CARCINOMA MAMMAE—DISSEMINATIONES
(*Disseminated Carcinoma of Breast*)
Plate IX, Fig. 14.
CARCINOMA MAMMAE UTRIUSQUE(*of both Breasts*)
—"CANCER EN CUIRASSE"
Plate X, Fig. 15.
CARCINOMA MAMMAE (*of Breast*)—**LYMPHANGITIS CARCINOMATOSA** (*Carcinomatous Lymphangitis*)
Plate XI, Fig. 16.

Of the carcinomas of glandular organs those of the female mammary gland are among the most common (they take the third place). They show a typical unrestricted epithelial proliferation in their origin and development. Observations made on cancer of the breast, therefore, have manifold bearings on carcinoma of other organs. A division into soft, many-celled, rapidly growing tumors of which the medullary cancers represent the most malignant, and slow-growing scirrhous forms with few cells, is of clinical importance.

The exciting causes include inflammatory irritation, puerperal interstitial mastitis, eczema of the nipple, antecedent benign tumors (fibro-adenoma,

Fig. 10. Carcinoma mammae — Lymphomata carcinomatosa.

Fig. 11. Carcinoma mammae exulceratum.

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cysts) injuries, mechanical irritation, frequent parturition with prolonged suckling of infants. Cancer of the breast is attributed by the public to injuries (blows), but these are often too recent to be accepted as an etiological factor, considering the slow growth of the carcinoma.

It is a remarkable fact that of sterile women only 10 per cent. have cancer of the breast. In 10 per cent. of the cases there is said to be a hereditary tendency.

Women are most often affected at the menopause (fortieth to fifty-fifth years), and come to the surgeon with nodules in the breast which have been hitherto painless and are only accidentally observed. These nodules very soon form a malignant growth of hard consistency and irregular surface. The most important sign of a malignant new growth is the absence of any demarcation or encapsulation. The tumor cannot, like all benign tumors, be separated from the mammary tissue and moved freely, but is fixed immovably in the glandular tissue, with ill-defined boundaries, and is anchored in the meshes of the mammary tissue by numerous offshoots. The nodules, which at first appear harmless, thus soon show their malignity. Accompanied by lancinating pains in the thorax, upper arm and shoulder, the tumor sends its destructive offshoots in all directions into the neighboring tissues, without limit or restraint, and reaching the surface adheres to the skin and causes retraction and fixation of the nipple. Finally, it gives rise to a hard inflammatory infiltration of the whole of the overlying skin. At the same time the tumor extends deeply and soon infiltrates the lymphatics beneath the pectoralis major muscle and also the regional lymphatic vessels and glands of the axilla (Fig. 10), which are usually affected about a year after the formation of the nodules in the breast, and take the form of hard, solid, painless nodules, which are often difficult to

feel in corpulent women. Extensive glandular affection gives rise to radiating pain and œdema of the arm (supra-clavicular glands). Although the cancer usually arises as a single nodule, there are cases in which several nodules develop simultaneously (Fig. 10) and extend through the whole breast to the axilla (Fig. 10). The prognosis is unfavorable in these cases, and in disease of both breasts (Fig. 15).

The disease is very frequently situated in the upper and outer quadrant of the breast, especially on the left side. The tumors situated in the outer half of the mamma towards the axilla, wrongly called paramammary carcinomas, are really glandular cancers, for they originate in the offshoots of the mamma which extend towards the clavicle, sternum, axilla and twelfth rib in the form of long, thin cords.

Cancer of the breast, like all cancers rich in cells (acinous, tubular), grows rapidly, especially during pregnancy, and causes destruction of the skin. A cancerous ulcer results, characterized like cutaneous carcinoma by its hard, raised, fixed borders, crateriform base and sanious discharge. A hard infiltration develops round the tumor which is usually fixed to the thorax. Small nodular thickenings of the adjacent unbroken skin sometimes constitute the first sign of commencing general cutaneous dissemination (Fig. 11). In this way the whole mamma may be transformed into a large ulcer (Fig. 15).

In other cases a tumor is gradually developed involving the whole breast without breaking through externally. The skin, however, may be infiltrated and the redress may be mistaken for inflammatory infiltration (Figs. 14 and 16). These leathery infiltrating forms of breast cancer finally envelop the whole mammary region like a cuirass (Fig. 15).

In the infiltrated skin these often appear small, pin-point disseminations of the carcinoma (Fig. 15, right side), which by confluence give rise to a nodular infiltration of the whole thorax (Fig. 14).

Fig. 12. Carcinoma mammillare.

In cancers which are poor in cells (scirrhous) the mammary gland is often diminished in size by shrinking, and the skin becomes puckered over the tumor by cicatricial contraction (Fig. 10).

Differential Diagnosis. Ulcerated cancers of the breast and those with hard, raised infiltration are difficult to mistake, but small tumors in the substance of the breast have to be diagnosed from interstitial mastitis, benign tumors (fibro-adenomas, cysts and mixed tumors) and abscesses, in which there is frequently deceptive induration. The age of the patient, the continuous growth of the nodules, the appearance of hard, lymphatic glands in the axilla, and the frequent occurrence of emaciation and cachexia even in small cancers assist in the diagnosis, which in doubtful cases can be established by excision of a piece for examination. Sarcoma occurs at an earlier age in the form of soft tumors extending to the skin, and presents a fairly typical clinical picture which should not be confounded with carcinoma (Figs. 29 and 30). The glands are generally unaffected in sarcoma.

Treatment. Radical excision of the whole breast and its processes as early as possible, with removal of the pectoralis major and in some cases also the pectoralis minor, and complete removal of the axillary glands is necessary for a permanent cure. In *v. Bergmann's* clinic there were 29.79 per cent. permanent cures out of 1,000 cases, *i.e.* free from recurrence three years after the operation. Recurrence is much less common in the axillary glands than locally. If of small extent they can be treated by excision, if larger by the X-rays (Fig. 15).

All cases with extensive dissemination in the skin (Fig. 14), diffuse infiltrating cancer, "cancer en cuirasse" (Figs. 15 and 16) are unsuitable for opera-

tion. In cases where the supra-clavicular glands are extensively affected, permanent cures are hardly ever obtained, even after radical operations including section of the clavicle and ligation of the axillary vein; so that it is best to abandon the operation. Also tumors which are adherent to the ribs, and fixed glandular tumors extending to the axilla are unsuitable for operation, for the recurrence generally takes place before the patient has recovered from the operation. Operation is also contra-indicated in cases of severe cachexia, in the atrophic slow-growing forms met with in old people, in cases with metastatic growths in the lung, liver and bones (often leading to spontaneous fracture of the neck of the femur.)

In the region of the head metastatic carcinomas are sometimes inoperable. Owing to their circumscribed encapsuled formation with soft contents they may be confounded with atheromatous cysts. According to *Schimmelbusch* they arise in this form through embolism of cancer cells, and thus form encapsuled freely movable nodules.

[The first brain tumor operated upon was an encapsulated metastatic carcinoma resulting from a mammary cancer.]

In cases of inoperable carcinoma the X-rays may lead to epidermization, especially in the ulcerated forms, after previous removal of the ulcerated parts. In discharging cancers powdered charcoal or chloride of zinc may be used locally, and high doses of morphia internally.

Cases hitherto reported as cured by X-rays are fallacious. No doubt a carcinomatous nodule may disintegrate and disappear under the action of the X-rays, but there is always a further growth in other parts—glands and internal organs. As regards castration for advanced mammary carcinoma in women, further experience is required.

Doyen's serum treatment of cancer has so far given no results.

Fig. 10 shows an acinous carcinoma forming several nodules in the breast, already infiltrating the skin. The axillary glands form hard, fixed, indolent nodular swellings, and nodules can be easily traced in the form of a rosary from the mammary gland to the axilla. The nipple is retracted and fixed, and the whole breast is diminished in size. Operation was performed in the usual way. The patient was already emaciated.

Fig. 11. A single cancerous nodule in a male breast. The skin has broken down and shows a cancerous ulcer with hard, raised, jagged edges, which has destroyed the nipple. The floor of the ulcer is irregular and the whole tumor is fixed to the pectoral muscle. At the edge of the ulcer the skin is radially contracted and shows isolated cancerous nodules. The axillary glands are hard, visible and hardly movable. In spite of the small size of the tumor there was already cachexia. After removal of the mamma with the pectoralis major and the axillary glands the wound, which could not be completely closed by suture, was repaired by *Thiersch's* grafts.

Cancer of the male breast (about 1 per cent. of all mammary carcinomas according to *Schuchardt*) generally arises as a small, hard nodule (scirrhous) in the neighborhood of the nipple and gives rise to a typical cancerous ulcer. The tumor occurs between the fortieth and seventieth years. Heredity appears to be frequent. Occasionally cancer of the breast is seen in husband and wife.

Fig. 12 shows a very rare case of carcinoma arising from the nipple (squamous-celled epithelioma). This is more common in men than in women. It commences as a hard infiltration of the nipple, in the same way as commencing carcinoma of the navel. The nipple is much retracted and the whole areola is transformed into a rigid wall. A cancerous ulcer soon develops which destroys the nipple and the

whole areola. At first there is no connection between this cutaneous cancer and the mammary gland.

The treatment consists in early extirpation of the mammilla with the subjacent mammary tissue, by means of an oval incision with subsequent suture. Recurrence is rare after early treatment. In doubtful cases with induration of the mammilla excision should always be performed.

Fig. 13. Paget's disease, or chronic eczema of the nipple, which is refractory to all treatment. The eczema begins on the nipple, gradually extends to the areola and surrounding skin and assumes the form of eczema madidans pustulosum. Retraction of the nipple and dragging pains are caused by the presence of carcinoma under the nipple (cylinder-epithelioma), which at first has no connection with the nipple but later on may become attached to it. The mammary gland in this case shows hard infiltration round a nodule. In the normal parts of the skin there are small dimples. Obstinate eczema of the nipple accompanied by a tumor in the breast, with infiltration of the axillary glands and early cachexia, make the diagnosis clear and indicate removal of the whole mammary gland with the axillary glands. In cases of chronic eczema of the nipple resisting all treatment, excision of the mammilla is advisable. Out of 884 cases of mammary carcinoma in *v. Bergmann's* clinic there were only seven typical cases of Paget's disease. Two of the author's cases showed cancer of the mammary gland without connection with the eczematous nipple.

According to *Schambacher* and *Ribbert* this affection is an intra-epidermoidal carcinoma which gives rise to secondary chronic eczema, an hypothesis which does not explain all cases, and is yet to be proved by microscopic examination.

Fig. 14. This is a case of tubular carcinoma (Billroth) with cutaneous dissemination which has

Fig. 13. Carcinoma mammae — Paget Disease — Eczema chronicum mammillae.

Fig. 14. Carcinoma mammae — Disseminationes.

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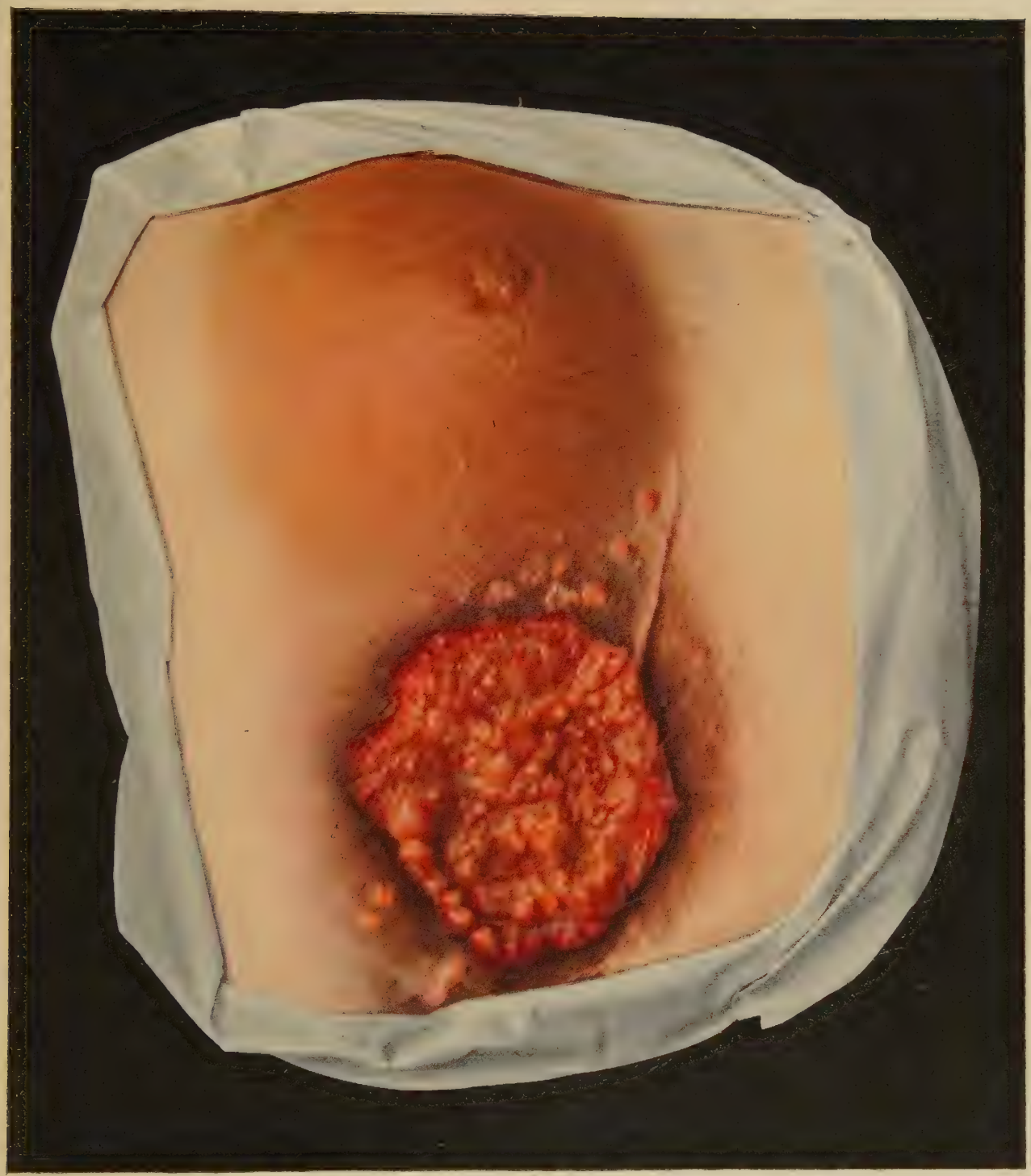

Fig. 15. Carcinoma mammae utriusque. — Cancer en cuirasse.

Fig. 16. Carcinoma mammae. — Lymphangitis carcinomatosa.

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extended in all directions and spread over the thorax. The development of nodules in the skin occurs early. These appear at first as punctiform, bluish, glistening elevations, which increase in number and size and coalesce, forming a kind of cuirass inclosing the thorax in a rigid mass. (Cancer en cuirasse, *Panzerkrebs*). These cases are inoperable.

Fig. 15. This is a case of inoperable cancer, en cuirasse, in which both mammæ are affected with carcinoma. On the one side there has been a recurrence of the growth in the scar soon after operation, where a soft, fungous, easily bleeding ulcer presents itself. In the surrounding skin there are several isolated nodules. The left mammary gland is involved in a hard, immovable, carcinomatous infiltration. The transmigration of a carcinoma from one side to the other is possibly explained by the persistence of congenital lymphatics.

Fig. 16. At first sight this appears to be a pyogenic inflammation. However, the bluish color, the retraction of the nipple, the hard, immovable breast forming a large tumor, and the extensive metastases in the axillary and supra-clavicular glands lead to a diagnosis of carcinoma. *Volkmann* has named this very rare form of cancer—mastitis carcinomatosa. That we have here to deal with an affection of the lymphatics (lymphangitis carcinomatosa) is shown by the punctiform red spots between the two breasts, the larger punctiform or circular spots below the clavicle and the changes in the region of the neck. The latter is of a blue color and the seat of hard infiltration which is not inflammatory but due to plugging of the lymphatics with cancer cells, and consecutive œdema.

The three last plates (Figs. 14, 15 and 16) show the terrible effects of advanced cancer of the breast, so that the necessity for the earliest possible diagnosis and radical removal by operation must once more be urged.

Naevus Carcinoma

Plate XII, Fig. 17.

ATHEROMA—CARCINOMA (*Sebaceous*)
Plate XIII, Fig. 18.

Fig. 17. Carcinoma of the scalp is very rare and usually arises on the basis of old scars, ulcers, warts, atheroma (sebaceous cysts) and moles. Pigmentary nævi, which are congenital or appear soon after birth, when they appear as warty formations, belong to the class of benign tumors. Occurring over the whole body, they were included by *v. Recklinghausen* among diseases of nerves. While the growth of the nævus ceases with the growth of the body, changes occur in later years which may take the form of papilloma, sarcoma, carcinoma or malignant melanoma. In the case represented in Fig. 17, a rapidly growing tumor arose from a congenital nævus in the thirty-seventh year; the cutaneous covering soon disappeared and the tumor was separated by deep fissures into cauliflower growths. The ulcerated surface is covered with sanious secretion, so that macroscopic examination often does not decide whether it is a case of ulcerated carcinoma or sarcoma. That it is a malignant growth is shown by the rapid growth of the tumor, which in a short time extends over and destroys the whole nævus; the early adhesion to the bones; the regional glandular metastases in the form of hard, slightly movable nodules behind the ear, and the cachexia of the patient. On account of the glandular metastases which soon extend along the large vessels from the neck to the supra-clavicular

Fig. 18. Atheromata — Carcinoma cutis.

Fig. 17. Naevus verrucosus — Carcinoma cutis.

region, the case is presumed to be a carcinoma of the scalp on the basis of a nævus (pigmentary carcinoma), but there remains the possibility that microscopic examination may show it to be a pigmentary sarcoma.

Treatment. This consists in extirpation of the tumor and the rest of the nævus, repair by a plastic operation, and removal of the diseased glands. In large nævi of the head and face a portion of the nævus can, in some situations, be removed by an elliptical incision and subsequent suture (*Dieffenbach*). Owing to the elasticity of the skin of the head large nævi can often be removed without repair by plastic operation. As soon as changes of any kind appear in a nævus, especially in advanced age, it is important to remove it as soon as possible. It is best to remove all pigmentary nævi because fatal malignant melanomatous growths so often develop even from the smallest pigmentary spots.

Fig. 18. Along with multiple sebaceous cysts scattered over the whole scalp, is a carcinoma originating from one of the cysts. The sebaceous cysts, commencing as small yellowish nodules in the skin, slowly grow into large tumors with a broad base and smooth surface. The cysts are fixed to the skin but easily movable over the subjacent bone, and have a doughy consistence often resembling fluctuation. If this mobility of the cyst over the subjacent tissues ceases and the originally soft tumor becomes a hard nodule with an irregular rough surface, malignant degeneration is to be suspected; apart from the occurrence of calcification in its walls, in which, moreover, the spherical smooth surface is generally preserved. This suspicion becomes a certainty when the skin gives way and there appears a rapidly growing nodular tumor characterized by multiple lobulation and secreting a fetid discharge. These carcinomas resemble in many ways the formation

of a discharging sarcoma (Fig. 33), and often cause severe pain owing to inflammation round the tumor. Cachexia occurs early, and the patients are usually of advanced age.

The diagnosis of carcinoma depends on the hard multiple glandular enlargement, which affects the whole nape of the neck. This usually occurs later and is not so hard in sarcoma.

Treatment. This consists in extirpation of the carcinoma, and involves removal of part of the external table of the skull on account of the tumor being fixed to it. The extensive space left by removal of the tumor can be sutured after making two long lateral incisions over both ears and undermining of the scalp. The spaces left by the lateral incisions can be repaired by *Thiersch's* grafts. The glands in the nape of the neck must also be removed.

On account of the early appearance of glandular metastases the excision of especially indurated sebaceous cysts is indicated. Moreover, as there is always a possibility of malignant degeneration, it is advisable to remove every sebaceous cyst by dissecting it out, so as to avoid recurrence.

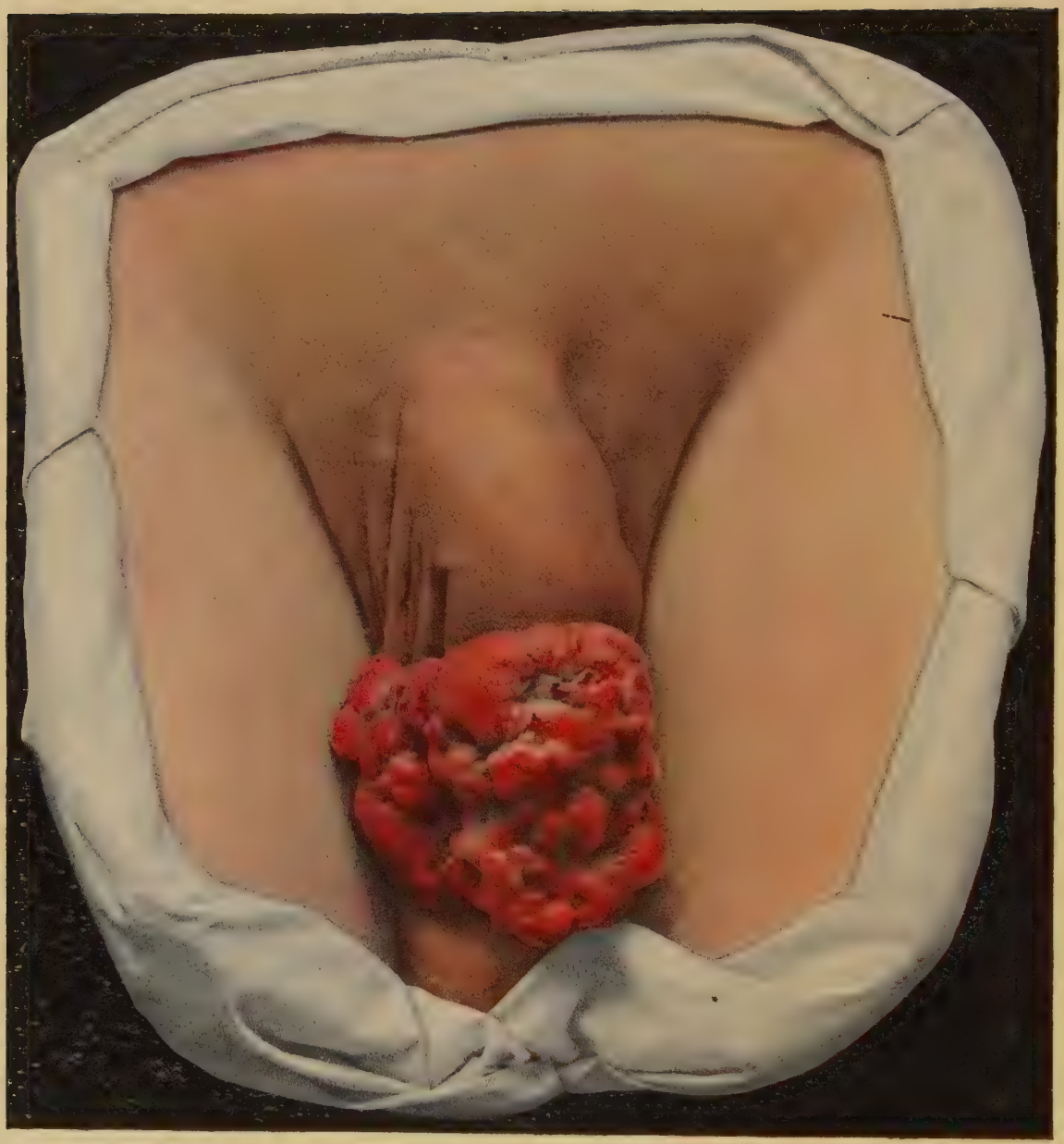

Fig. 19. Carcinoma penis — Leukoplakia.

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Carcinoma Penis

Plate XIII, Fig. 19.

Carcinoma of the penis begins on the glans or in the coronary sulcus as a squamous-celled epithelioma, generally between the fiftieth and seventieth year. Predisposing causes are congenital phimosis with preputial concretions, leucoplakia præputialis (white glistening patches similar to leucoplakia of the tongue and cheek), warts, long-standing tuberculous and syphilitic ulcerations. Old fistulæ, which occur especially in eunuchs after removal of the scrotum, testicles and pendulous part of the penis, near the symphysis or perineum, also predispose to carcinoma.

The usual form is that represented in the figure, a warty carcinoma which destroys the prepuce and soon forms a cauliflower growth. Between the individual hard nodules destitute of skin appear crateriform excavations which are characteristic. Epithelial plugs can be expressed from the growth, and in other parts the surface is cornified. Thus, continuous growth alternates with permanent disintegration. The rapidly developing nodules often cause exhausting hemorrhage, while the breaking down of the carcinoma gives rise to a fetid sanious discharge. The borders of the growth are hard, raised and prominent. The whole penis may be transformed into a large growth which may extend to the scrotum, testicles and pelvis. The growth may destroy the urethra and cause much pain on micturition.

A more rare form of carcinoma arises as a small ulcer, generally on the corona glandis. It is hidden by the resulting phimosis, but its characteristic hard borders can be felt distinctly and there is a sanious secretion. The inguinal glands are affected early and point to the diagnosis of carcinoma. The growth at first causes the patient little inconvenience, but quickly leads to severe cachexia, so that the patients often present themselves with extensive metastases of the inguinal and retro-peritoneal glands, and are in an inoperable condition. A saying of *Kauffmann's*, "In old men with phimosis and offensive discharge the possibility of cancer is always to be borne in mind," merits special consideration.

Differential Diagnosis. Both forms of carcinoma are so characteristic that they can hardly be confounded with other affections. The papillomatous form at first sight suggest condylomata acuminata when these have coalesced into soft tumors, but in these the borders are as soft as the rest of the growth. A phagedenic ulcer may cause destruction of the glans penis, but the necrosis resulting from the rapid destruction differs from the proliferation of the carcinoma, and the phagedenic ulcer soon heals after cauterization. Syphilitic chancre also has hard borders like the cancerous ulcer, but its surface is smooth in distinction to the ragged surface which is always present even in small cancerous ulcers. Search may also be made for the Spirochæta pallida of syphilis.

Sarcoma affecting the corpus cavernosum are soft rapidly growing tumors, and for a long time have no glandular metastases.

Treatment. Amputation of the penis and removal of the glands from both inguinal regions. The prognosis is favorable if the glands are not affected before operation. In cases where the car-

cinoma has already affected the whole penis, testicles and prostate, a radical operation may be attempted by temporary section of the pubis on both sides (*Bramann*, *Lexer*, *Manz*), unless extensive glandular or organic metastases contra-indicate any intervention. Recurrence is frequent at the seat of amputation. In inoperable cases the cancerous ulcer can be destroyed with *Pacquelin's* cautery and afterwards treated by X-rays.

CARCINOMA CUTIS EX COMBUSTIONE (*of Skin after Burn*)
Plate XIV, Fig. 20.
CARCINOMA CUTIS EX VERRUCA (*of Skin after Wart*)
Plate XV, Fig. 21.
CARCINOMA CUTIS EX CICATRICE (*of Skin after Cicatrix*)
Plate XV, Fig. 22.

Cutaneous carcinomas of the extremities are comparatively rare and always follow preceding changes or morbid conditions in the skin. Most frequently they arise on the basis of old scars of various origins, especially from hypertrophic keloidal scars left after extensive burns. *Hawkins*, in 1835, described carcinomas arising from scars left after severe flogging, mostly in sailors. *Dietrich* described a carcinoma originating in the scar from osteomyelitis, which was for a long time regarded as primary carcinoma of bone. The scar generally becomes fissured, forming a small wound which afterwards becomes a carcinomatous ulcer (Fig. 21) with all its characteristic features, hard borders, papillomatous proliferations, ragged surface and epithelial plugs. A cauliflower tumor grows which soon becomes fixed to the fascia (Figs. 20 and 22).

Warts, old-standing ulcers of the leg and lupoid changes in the skin also lead to carcinoma of the extremities. Eczema of the skin occurring in chimney-sweeps and workers in paraffin has often led to multiple carcinoma of the extremities.

Fig. 20 shows a papillary carcinoma of the skin of the leg arising from the scar of a burn. The smooth, partly white and partly brownish, shiny scars of the burn are seen over the whole leg. The carcinoma has extended above and below and has

Fig. 20. Carcinoma cruris ex combustione.

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Fig. 22. Carcinoma cutis ex cicatrice.

Fig. 21. Carcinoma cutis ex verruca.

extended round the whole circumference of the leg. The soft, cauliflower proliferations have given rise to severe hemorrhages. From the depth of the growth there is a sanious discharge. The borders of the tumor are very hard and raised, and are immovable over the fascia. The inguinal glands were already involved.

Treatment. Amputation through the thigh with removal of the inguinal glands. In cases of chronic ulcer of the leg with commencing carcinoma in the form of hard, prominent tumors in the soft granulations, it is best to remove the whole ulcer as early as possible.

Fig. 21 shows a carcinoma in a common situation, the back of the hand, arising from a wart and forming a characteristic carcinomatous ulcer. As the growth was still movable over the fascia, and there were no glandular enlargements, it was excised and the gap repaired by a pedunculated flap from the forearm. The rapid growth of these small tumors with hard borders makes early diagnosis and removal necessary, so as to avoid recurrence.

Fig. 22 shows a very extensive carcinoma arising from the scar of an injury two years before. In this case the irregular, wall-like, hard, irregular borders are very marked. The floor of the ulcer is in some places cornified and is covered with crusts and sanious secretion. The carcinoma has already extended through the fascia to the bones, interfering with the function of the hand. The glands of the elbow and axilla are hard and nodular. The rapid growth of the tumor has led to severe cachexia.

Treatment. Amputation through the arm and removal of glands.

Melanocarcinoma

Plate XVI, Fig. 23.

The malignant melanomas (melanosarcoma, melanoendothelioma and the rarely occurring melanocarcinoma) occur most often in the skin, also in the adjacent mucous membrane, and in the choroid and iris. In the skin they arise from benign melanomas, especially from flat pigmentary nævi, and from warts which become continually irritated. Warts on the sole of the foot and on the fingers often give rise to these growths. A sessile or pedunculated tumor develops, which is characterized by black, bluish-black or brownish-yellow coloration (Fig. 23). The skin soon becomes ulcerated, and by the breaking down of the tumor a deep ragged ulcer is produced. Melanocarcinomas are characterized by the hardness of the base of the tumor, thus differing from the soft, easily bleeding melanosarcomas which rapidly disintegrate into a brownish-black watery mass, and form the soft, bleeding angiosarcomas.

Melanocarcinoma of the skin not only grows deeply towards the fascia, but also forms early disseminations in the skin, in the form of small black nodules in the neighborhood of the mother tumor, which form a large growth by confluence.

The great malignity of these tumors is shown by the early appearance of metastases in the regional lymphatic glands, which generally form larger tumors than the primary one; also by the early infection of the lungs, liver, heart, brain, and other organs by metastatic deposits.

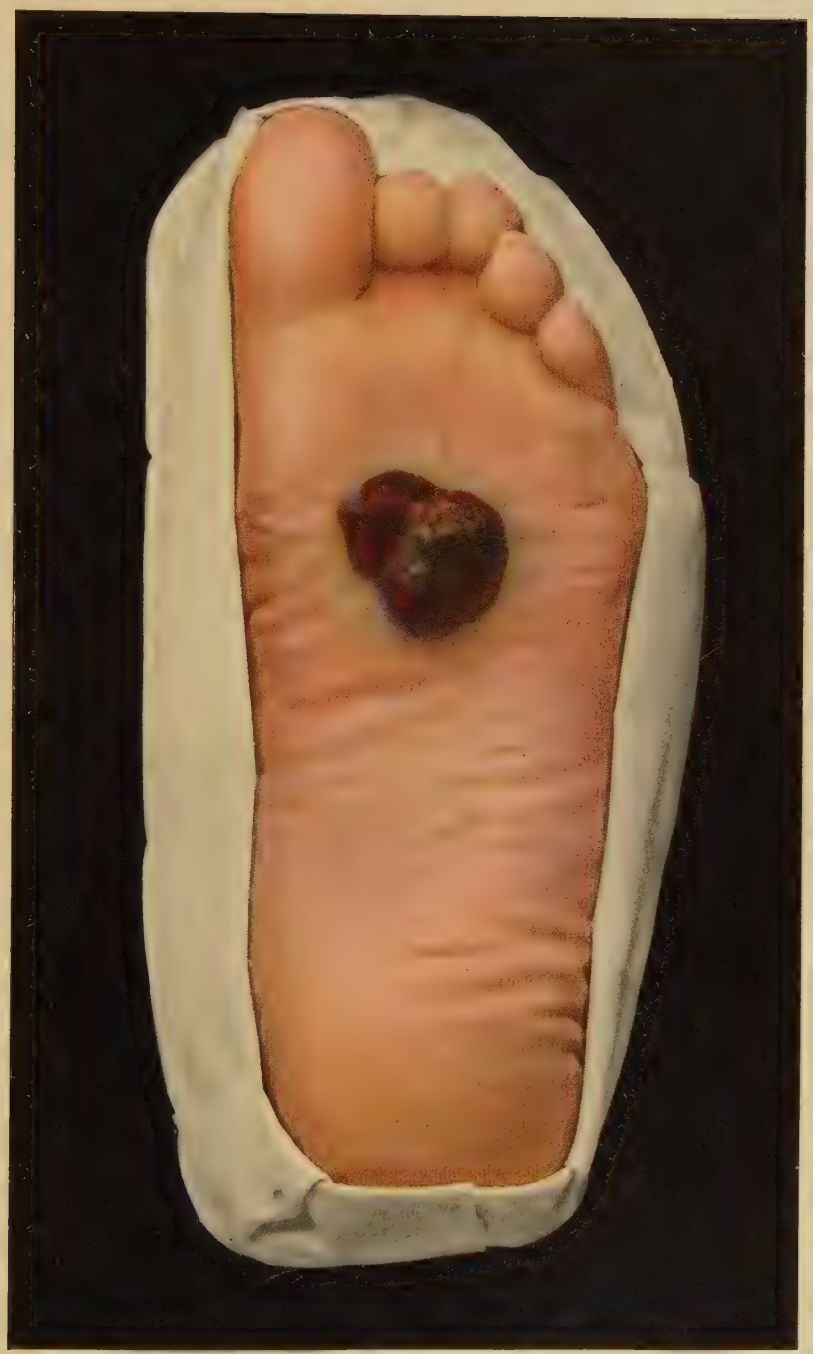

Fig. 23. Melanocarcinoma cutis ex verruca.

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Owing to the rapid development of these metastases pigmentation is usually absent in them.

Melanocarcinomas may be seen in children as multiple growths in the skin in connection with xeroderma pigmentosum. The rapid growth and frequent hemorrhages lead to severe anæmia.

Treatment. Small tumors of the skin can be widely removed with the fascia. In the extremities the best and most radical method is amputation and removal of the regional glands. In spite of early and extensive operation recurrence is very frequent, and in *v. Bergmann's* clinic only one case is known to be free from recurrence after a year. It is, therefore, urgent to take prophylactic measures by excising all pigmentary nævi, especially in advanced age, and all warts which become continually irritated or inflamed. The gap left by removal of extensive pigmentary nævi of the face must be filled by skin flaps. Cauterization of nævi and warts is to be condemned, as the irritation may be an exciting cause of tumor formation.

Fig. 23 shows a tumor arising from a pigmentary wart; the alveolar structure on microscopic examination showed it to be a melanotic carcinoma. In spite of amputation of the leg and removal of the inguinal glands, death resulted from organic metastases.

Sarcoma

Plates XVII—XXVI.

LYMPHOSARCOMA COLLI (*of Neck*)
Plate XVII, Fig. 24.
SARCOMA EPIPHARYNGEALE (*Epipharyngeal Sarcoma*)
POLYPOSIS NASI MALIGNA (*Malignant Nasal Polypus*)
Plate XVIII, Fig. 25.
ANGIOSARCOMA CUTIS (*of Skin*)
BOTRIOMYCOSIS
Plate XIX, Fig. 26.
SARCOMA FUNGOIDES ORBITAE
(*Fungating Sarcoma of Orbit*)
Plate XIX, Fig. 27.
MELANOSARCOMA CUTIS (*of Skin*)
LYMPHOMATA SARCOMATOSA COLLI
(*Sarcomatous Lymphoma of Neck*)
Plate XX, Fig. 28.
SARCOMA MAMMAE EXULCERATUM
(*Ulcerating Sarcoma of Breast*)
Plate XXI, Fig. 29.
SARCOMA MAMMAE CYSTICUM (*Cystic Sarcoma of Breast*)
Plate XXII, Fig. 30.
SARCOMA CUTIS MULTIPLEX (*Multiple Sarcoma of Skin*)
Plate XXIII, Fig. 31.
SARCOMA HUMERI PERIPHERICUM
(*Peripheral Sarcoma of Humerus*)
Plate XXIV, Fig. 32.
SARCOMA FASCIAE BRACHII EXULCERATUM
(*Ulcerating Sarcoma of Brachial fascia*)
Plate XXV, Fig. 33.
CHONDROMYXOSARCOMA GENUS (*of Knee*)
EXOSTOSES MALIGNAE (*Malignant Exostosis*)
Plate XXVI, Fig. 34.
SARCOMA GIGANTOCELLULARE (*Giant-celled*)—**EPULIS**
Plate XXVII, Fig. 35.

The tumors formerly called Sarcoceles owe their name to the fact that they have the appearance of fleshy masses on section. In distinction to carci-

nomas the sarcomas develop from the various connective tissue elements, with the exception of endothelium, and may, therefore, arise in the skin, subcutaneous tissue, fascia, periosteum, bone, nerves, and in the connective tissue of all other organs. Owing to the often very rapid growth the newly formed cells do not attain complete maturity, so that the sarcoma consists of imperfectly developed connective tissue. In its early stages it often resembles, microscopically, inflammatory granulation tissue, but by its rapid growth it soon assumes the appearance of a malignant tumor. The bulk of the sarcoma is formed of various connective tissue cells, while the interstitial fibrous tissue is scanty. The abundant formation of new blood-vessels is characteristic of sarcoma.

The transition of fibromas, especially those which arise from the connective tissue of fascia, and of other connective tissue tumors *e.g.* chondroma, into sarcoma has been demonstrated.

Patients often attribute these growths to various injuries, but there is no direct proof of this.

The pure sarcomas are classified according to their microscopic structure into round-celled, spindle-celled and giant-celled sarcoma. Those formed of various tissues are known as lympho-, myxo-, fibro-, chondro-, angio-, and glio-sarcoma. The pigmentary or melanosarcomas are placed in a special group.

Clinically, sarcomas are best divided into soft, many-celled, quickly growing, very malignant, easily recurring (medullary sarcoma, usually small round-celled sarcoma), and the hard, few-celled, slow-growing, less malignant forms (spindle-celled and giant-celled sarcoma). In the first form the soft consistence is due to the richness in cells and the scanty development of interstitial tissue. Compared with carcinomas, sarcomas are more circumscribed and at first almost completely encapsuled tumors, with borders as soft as the rest of the tumor.

Owing to frequent hemorrhages and softening in the interior of the sarcoma cystic cavities are formed which can be recognized by the presence of fluctuation (Figs. 25 and 30). Sarcomas situated under the skin gradually destroy and break through it and proliferate on the surface in a variety of forms. Fleshy reddish-brown parts alternate with yellowish-white, pulpy parts in these tumors. There are usually blood extravasations, both old and recent. The whole tumor has the appearance of a fungoid mass (Figs. 26, 27, 29 and 33). After a time these superficially proliferating growths break down and set up inflammation, so that the characteristic appearance of the sarcoma is lost, and, on the scalp and extremities, for example, it cannot be distinguished from a discharging soft carcinoma. As the sarcoma usually breaks through the skin and proliferates on the surface, so may it extend into all the deeper tissues, so that finally an enormous tumor is formed which may destroy the bones (Figs. 25, 27 and 33).

The second form, the slow-growing, few-celled tumors, resemble fibromas and often represent transitional forms (fibro-sarcoma). The latter sometimes occur as multiple nodules in the skin.

These tumors often occur in robust people in middle life (thirty to fifty). Very often sarcoma is congenital or appears in infancy (kidneys and testicles), also soon after puberty (mammary gland). The earlier the tumors appear, the more malignant they are as a rule. Multiple sarcomas are seen in the skin as pigmentary sarcomas (Fig. 31) and in the bones.

The soft sarcomas lead to metastases much more often than the hard forms. Metastatic deposits are formed by growth of the tumor into the large veins and the formation of emboli, which are carried to the lung, spleen, liver and brain. Dissemination by way of the lymphatics is almost completely absent. The latter are certainly often involved, especially in ulcer-

ated sarcoma and melanotic forms; also in sarcoma of bone.

By the entrance of the tumor cells into the blood stream and by the setting up of inflammatory processes a condition of fever is produced.

In many cases the body is so quickly affected by metastases that the patients soon succumb from severe anæmia. Unfortunately patients often come for treatment when there are already metastases in the lung causing pleural effusion and hemoptysis.

Differential Diagnosis. Sarcoma differs from carcinoma in the softer consistence of the tumor and its regular surface, and from benign tumors by its rapid growth. The distinction from syphilitic products is often difficult and sometimes not settled by microscopic examination, and according to *Esmarch* many growths were formerly extirpated as sarcoma which might have been cured by anti-syphilitic treatment.

Treatment. All tumors in which there is a suspicion of sarcoma should be removed as early and as radically as possible. As the tumors are sometimes encapsuled, operation has been unfortunately limited to enucleation in these cases; but, as in carcinoma, the tissue surrounding the tumor, which is already infiltrated by tumor cells, must be removed. In cases of soft, rapidly growing sarcoma of the extremities, the question of amputation and even disarticulation arises. In spite of operation recurrence is frequent; either locally or in the form of disseminated nodules, less commonly in the form of lymphangitis sarcomatosa. In the hard forms of sarcoma recurrence may also occur, in the form of soft growth, which is a most unfavorable sign.

Inoperable cases have been treated with the X-rays, but the action is only superficial (*Unger, Schlesinger*). By this treatment the superficial nodules are

destroyed, just as in intercurrent erysipelas, but the tumor continues to grow in the deeper tissues and in other places. Subcutaneous injections of arsenic and atoxyl are worth a trial, and iodide of potassium in large doses may be administered. Serum therapy has so far given no results.

Fig. 24. Lymphosarcoma colli.

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LYMPHOSARCOMA COLLI (*of Neck*)

Plate XVII, Fig. 24.

Clinically, the name lymphosarcoma is best applied to those sarcomas which originate in lymphatic glands, whether their cells have the character of lymph cells or arise from the stroma of the glands. This is all the more indicated as both forms of sarcoma can only seldom be distinguished from one another, clinically or microscopically. The seat of predilection of these tumors is the region of the neck, where the lymphatics are abundant. A diffuse nodular tumor quickly develops from a group of small, hard, movable glands.

The malignancy of these tumors is shown, especially in young individuals, by the continual formation of fresh nodules at the periphery, which coalesce with the main tumor and cause it to attain a considerable size. The unlimited growth into the neighboring tissues is characteristic. The capsule of the glands is quickly broken through, thus differing from lymphoma. The cervical fascia is destroyed and the sterno-mastoid muscle invaded. The skin is at first reddish, then bluish red or livid; it then becomes thin and gives way over the tumor. The exposed parts of the tumor rapidly break down from inflammation. The sarcoma grows into the deeper parts, especially into the internal jugular vein, giving rise to fatal organic metastases. The vagus nerve and the common carotid also become enveloped and destroyed by the tumor. Dyspnœa and dysphagia may be caused by pressure on the larynx and esophagus. The tumor extends downwards into the mediastinum and may even destroy the vertebræ.

Lymphosarcoma is distinguished from other tumors of the neck by its rapid growth in all directions, its breaking through to the exterior, and its sanious disintegration.

The diagnosis is usually not established in the early stages as the growth is hard and limited to the glands; microscopic examination is also inconclusive.

Differential Diagnosis. Malignant lymphoma (*Hodgkin's* disease, pseudoleukæmia) which usually begins in the neck, consists of small, multiple, encapsuled nodules which do not break down nor extend to the neighboring organs. There are generally also glandular enlargements in the axillæ, groins and mediastinum, and changes in the spleen and bone-marrow.

Leukæmic lymphoma can be diagnosed by the blood changes.

Tuberculous glands are characterized by the isolated groups of glands of different consistence—hard, soft, or fluctuating.

Syphilitic glands are at first hard, later on soft; but are not so extensive.

Branchiogenous carcinoma (*v. Volkmann*), arising from the remains of the epithelium of the branchial clefts, is very rare and appears as very hard, spherical tumors in the carotid fossa.

Metastatic carcinoma and sarcoma can be diagnosed by the presence of the primary tumors (scalp, esophagus, parotid, maxilla).

Actinomycosis may also cause hard infiltration of the neck, but the infiltration is diffuse and uniform, not nodular, and extends over the whole region of the neck.

The tumors affecting the sheaths of the blood-vessels, first described by *Langenbeck*, are to be regarded as lymphosarcomas which have involved the vascular sheaths at an early period.

Treatment. Extirpation of lymphosarcoma has only a chance of success by early diagnosis, and even then recurrence is frequent. For the removal of such extensive non-encapsuled tumors much intervention is necessary, in some cases including temporary ligature of the common carotid. As the internal jugular vein and vagus nerve are usually removed with the common carotid, with consequent disturbances (encephalomalacia, pneumonia), many prefer internal treatment with high doses of arsenic, or by the X-rays, by which means transient improvement may be obtained.

Fig. 24 shows an extensive lymphosarcoma of the neck. The tumor extends diffusely over the whole of the right side of the neck and is constituted by several nodular, irregular formations. The skin is broken in one place, in others it is thin and of a bluish-red color. There is a sanious discharge from the fistula. Pressure of the tumor on the large vessels has caused severe cyanosis, and pressure on the recurrent nerve hoarseness and asphyxia. In spite of treatment by arsenic and the X-rays the patient continued in a state of cachexia.

SARCOMA EPIPHARYNGEALE (*Epipharyngeal*)
POLYPOSIS NASI MALIGNA (*Malignant Nasal Polypus*)
Plate XVIII, Fig. 25.

In the naso-pharynx two kinds of growths claim special attention—fibromas, usually occurring in males between the twenty-fifth and thirtieth years, also called naso-pharyngeal polypi, arising from the basilar process—and sarcomas, which appear between the thirtieth and fiftieth years. *Langenbeck* separates tumors arising in the spheno-palatine fossa as retro-maxillary tumors, but after further extension they cannot be distinguished from the two mentioned above.

The fibromas, occurring at the earlier age, generally arise from the connective-tissue cells of the periosteum as pedunculated or sessile encapsuled tumors, which by extensive growth fill up all the spaces and apertures of the naso-pharynx, especially the posterior nares, cause atrophy of the bones by pressure, and break through into the nasal cavity, maxillary antrum and cranial cavity. On account of their great vascularity these growths, which in some places often take the form of cavernous tumors, are of much softer consistence than other fibromas. The tumors may ulcerate on the surface and give rise to exhausting hemorrhage. On account of their tendency to increase and the frequent occurrence of sarcomatous tissue in them, they are to be treated as malignant growths.

In older individuals, in the majority of cases, we have to do with true sarcomas arising from the periosteum or fascia (malignant naso-pharyngeal polypi), which extend to the posterior nares, the

Fig. 25. Sarcoma epipharyngeale — Polyposis nasi maligna.

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spheno-maxillary fossa, Eustachian tubes and larynx; not, however, as encapsuled tumors like the fibromas, but as soft, fungoid, sessile, firmly attached growths with irregular boundaries. Later on they grow very rapidly, causing destruction of the neighboring bones, and extend to the surface through the frontal sinus, nasal cavity and orbit, and internally to the brain. (Figs. 25 and 27).

Disintegration of the growth goes hand in hand with the advancing growth and the patient succumbs from the results of hemorrhage, septic infection, anæmia and organic metastases.

The clinical symptoms in fibroma and in commencing sarcoma arise from obstruction of the naso-pharynx. Continually keeping the mouth open suggests disease of the naso-pharynx. Owing to obstruction of the posterior nares the patients snore during sleep; they acquire nasal catarrh (often atrophic rhinitis) and have a nasal voice. As the tumor extends, obstruction of the Eustachian tubes causes deafness and pain in the ear; extension to the cranial cavity causes headache, somnolence and choked optic disk; extension to the orbit causes disturbance of vision, *e.g.* diplopia. Pressure on the facial nerve and trigeminal causes paralysis and severe neuralgia.

The diagnosis of these advanced sarcomas presents no difficulty. The soft, fungoid consistence of the whole tumor, the tendency to bleeding and the rapid growth are characteristic. In extensive sarcomas with commencing disintegration and discharge soft glandular metastases are found. The commencing sarcomas can be recognized by digital and rhinoscopic examination as irregular, rough, infiltrating tumors, which differ from the nodular encapsuled fibromas.

Differential Diagnosis. It is only in young individuals that other lesions can be confounded with true tumors of the naso-pharynx. Hypertrophied

tonsils and extensive adenoids cause similar symptoms, but digital examination and rhinoscopy will make the diagnosis clear. In very young children teratomas are seen (Fig. 146), which may be mistaken for sarcoma arising from the basilar process and extending to the face. However, teratomas are usually more or less encapsuled and only appear on one half of the face.

Retro-maxillary tumors manifest themselves at first by unilateral pain in the face, swelling of the cheek and fixation of the corresponding maxillary joint, but on further extension they cannot be distinguished from advanced tumors of the naso-pharynx, or from large tumors of the upper maxilla or orbit.

Treatment. The removal of adenoid vegetations is best effected by *Gottstein's* curette. Even extensive adenoid growths may disappear spontaneously at the age of puberty. Hypertrophied tonsils are to be removed by the tonsillotome. For small fibromas an oral method may be employed, by means of division of the soft palate and part of the hard palate (*Nélaton*, *Gussenbauer*) or by temporary division of the lower maxilla. The tumors should always be removed by incision into healthy tissues with the knife. In extensive fibromas and all tumors suspected of sarcoma, the naso-pharynx must be freely laid open, by temporary resection of the hard palate together with the alveolar process (*Partsch*), or by temporary resection of both upper maxillæ and raising up the nose (*v. Bergmann*). Previous tracheotomy and ligation of the external carotid on one or both sides (*Kocher*, *König*), is expedient in these sanguinary operations. That very large tumors can be removed by extensive operations with good results is shown by the experience of *v. Bergmann's* clinic. Even tumors which had extended through the base of the skull and caused symptoms of cerebral pressure were successfully

removed. Naturally, the earlier diagnosis is made by digital examination and rhinoscopy (excision for examination is dangerous on account of severe hemorrhage, and also useless) the more can these complicated operations be avoided, and the more frequent are radical cures. Inoperable tumors (Fig. 27) may be treated by the X-rays or by the administration of arsenic and morphia. When the tumors fungate externally the ulcerated parts must be cauterized and treated with moist disinfectant dressings. In the last stages tracheotomy must be performed, to save the patient from death by asphyxia.

Fig. 25 shows a malignant naso-pharyngeal polypus which arose from the basilar process and was at first covered by the mucous membrane of the epipharynx. The disease was of ten years' duration. Various polypi were removed, and also a larger tumor, after partial resection of the upper maxilla, without success. The sarcoma then grew almost exclusively forwards through the posterior nares and destroyed the whole bony framework of the nose. The fairly symmetrical growth on both sides of the middle line shows the origin from the basilar process. in distinction to the more lateral swelling of retro-maxillary tumors. It forms a soft, partly fluctuating growth with fungating borders which has begun to extend over both eyes. In some places the skin is so thin that it appears livid and transparent; in other parts it shows the great vascularity of the skin characteristic of sarcoma. The tumor, already disintegrating, is on the point of breaking through. The whole nasal cavity and the whole naso-pharynx on digital examination were found to be filled with soft, infiltrating tumor masses, which had displaced the soft palate downwards and forwards, so that the growth could only have been removed by very extensive interference. The tumor had also extended through the base of the skull.

ANGIO-SARCOMA CUTIS (*of Skin*)
Plate XIX, Fig. 26.
SARCOMA FUNGOIDES ORBITAE (*Fungating Sarcoma of Orbit*)
Plate XIX, Fig. 27.

Fig. 26. Round-celled and spindle-celled sarcomas of the face are rare; angio-sarcoma is more common. In this case the tumor is pedunculated and is characterized by its concentric, spherical formation. The base of the tumor is surrounded by a ring of epidermic scales. The surface of the tumor is of a red color and resembles exuberant granulations. It is slightly uneven and somewhat resembles a strawberry. The tumor is of very soft consistence, easily bleeding at the slightest touch. The malignancy is shown by its rapid growth. It is distinguished from carcinoma by the absence of glandular enlargement.

Differential Diagnosis. The tumor resembles in appearance two diseases—frambœsia tropica (or yaws) and botriomycosis. The initial lesion in yaws is, however, soon followed by a general eruption of similar frambœsiform growths. The granular growths in both yaws and botriomycosis remain superficial, while the sarcoma extends into the deeper tissues.

In mycosis fungoides multiple growths occur which may develop into tumors resembling sarcoma.

Treatment. Early and free excision. In the face the defect may be repaired by a plastic operation.

Fig. 27. A very extensive sarcoma involving the left half of the face and already extending to the right

Fig. 27. Sarcoma fungoides orbitae.

Fig. 26. Angiosarcoma cutis.

half. Protruding from the orbit as a fungoid mass the tumor is characteristic of sarcoma (sarcoma fungoides). The soft edges have the typical reddish-brown color of sarcoma. In the places where the skin is destroyed soft masses with a fairly regular surface protrude, which differ from the ragged irregular ulcer of carcinoma. The whole of the tumor situated in the orbit is of soft, almost fluctuating consistence. In some parts the fungoid masses are breaking down and covered with sanious discharge. Blood crusts form on the ulcerations owing to the frequent hemorrhages in the tumor. The brown-colored skin is almost atrophied from pressure of the tumor. Sarcomatous masses protrude from both nostrils, and the whole buccal cavity and naso-pharynx is full of tumor masses, which have caused complete destruction of the bones of the face. The tumor has also extended through the base of the skull, causing extreme somnolence. It is no longer possible to decide whether it is a case of malignant naso-pharyngeal polypus, a retro-maxillary tumor, a maxillary tumor, or a periosteal sarcoma of the orbit. The last is the most probable, as the tumor was first observed in the orbit.

Treatment. Cf. Plate XVII.

MELANO-SARCOMA CUTIS (*of Skin*)
LYMPHOMATA SARCOMATOSA COLLI
(*Sarcomatous Lymphoma of Neck*)
Plate XX, Fig. 28.

This figure shows a hard, rough, movable, brownish-black tumor of the scalp, which rapidly developed from a pigmentary nævus in a man of nineteen. (Cf. Plate XVI, Fig. 23.) The hardness and rapid growth reveal a malignant tumor the nature of which (melano-carcinoma or melano-sarcoma) can only be decided by microscopic examination, for carcinoma and sarcoma of the scalp are very similar. The tumor has remained small and is covered by unbroken, pigmented skin.

The malignancy of the tumor is strikingly shown by the enormous enlargement of the regional lymphatic glands. Not only the glands of the nape of the neck, but also all the glands on the right side of the neck to the supra-clavicular fossa are transformed into soft nodular tumors. The consistence of these glandular tumors is so soft as to give the sensation of fluctuation (pseudo-fluctuation), which is characteristic of rapidly growing sarcomatous metastases. The patient rapidly succumbed after the appearance of metastases in the lungs (pleuritis exudativa).

The glandular metastases and innumerable nodules in the lungs and heart were white in color, the pigmentation of the mother tumor often being absent in the rapidly developing metastases of melanotic tumors.

Fig. 28. Melanosarcoma cutis — Lymphomata sarcomatosa colli.

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Fig. 29. Sarcoma mammae exulceratum.

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SARCOMA MAMMAE EXULCERATUM

(*Ulcerating Sarcoma of Breast*)

Plate XXI, Fig. 29.

SARCOMA MAMMAE CYSTICUM (*Cystic Sarcoma of Breast*)

Plate XXII, Fig. 30.

Sarcoma is much less common in the mammary gland than carcinoma (one hundred carcinomas to ten sarcomas, and half of these cysto-sarcomas, *v. Angerer*). All cell forms of sarcoma may be represented as well as mixed forms, such as myxo-, angio-, and melano-sarcoma.

They occur most often in young women. According to their composition they have different clinical signs. Spindle-celled sarcomas are of firm consistence and of slower growth than the soft, malignant, round-celled sarcomas and melanosarcomas. Cysto-sarcomas soon lead to extensive tumors which transform the breast into a large sac with fluid contents. The typical characteristics of sarcoma are generally present in the mammary tumors (Fig. 29).

Differential Diagnosis. Carcinoma is distinguished by the absence of any demarcation from the mammary tissue, while sarcoma is often encapsuled. Moreover, the clinical signs of carcinoma are so characteristic (cf. Plates V–XI) that confusion is hardly possible. Cysts of the mamma are usually situated behind the mammilla, multiple (in one or both mammæ), and not so large as true cysto-sarcoma. Fibroadenoma (to which the tumors incorrectly designated by *J. Müller* as cystosarcoma papilliferum phyllodes, rightly belong), which originate from the glandular tissue and show an abundant

development of connective-tissue cells, are slow growing, movable tumors, and are always encapsuled (cf. Plate XXVIII).

Treatment. Extirpation of the whole mamma as early as possible, with free exposure of the axilla. After early and extensive operations local recurrence is rare, and permanent cures more frequent than in carcinoma.

Fig. 29 shows a rapidly growing, round-celled sarcoma in a young girl. The tumor forms a soft, fairly circumscribed nodule in the mammary gland. That the part of the tumor lying in the mamma is considerably larger than the external appearance indicates is shown by the prominent veins. The tumor is near the mammilla but has caused no retraction of the nipple. It is freely movable over the pectoralis fascia. Externally it has involved the skin, which has the usual brownish-red color of sarcoma, has become very thin and is already ulcerated in one spot, from which repeated hemorrhage has taken place. The fungoid tumors, in distinction to carcinoma, have a smooth, uniform surface and resemble exuberant granulation tissue. There were no glands to be felt in the axilla. Treated by extirpation of the mamma and free exposure of the axilla.

Plate XXII, Fig. 30.

A cystic tumor occurring in a young woman, which has begun to displace the whole breast. There is no alteration in the nipple. The tumor is movable over the pectoral fascia, and in several places distinctly separate from the mammary tissue. The veins are enlarged from pressure of the tumor. The tumor has already invaded the skin, which has become very thin, and in some places fluctuating. The skin is colored brownish red and bluish green, and shows a network of vessels. As long as the skin is

Fig. 30. Sarcoma mammae cysticum.

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intact it can never be definitely ascertained whether it is a case of actual cavities filled with fluid, or the pseudofluctuation of gelatinous or mucoid sarcoma. Rapid growth and commencing soft glandular swellings in the axilla point to the diagnosis of a cystosarcoma.

Treatment. Extirpation of the mamma and removal of the axillary glands.

SARCOMA CUTIS MULTIPLEX (*Multiple Sarcoma of Skin*)

Plate XXIII, Fig. 31.

Multiple sarcomas of the skin, pigmented or colorless, may be congenital and then usually cause death after spreading over the whole body. Melanotic sarcomas arising from nævi and warts and the forms appearing in the skin as multiple nodules occur in middle life. In old people the multiple pigmentary sarcoma first described by *Kaposi* is found (hemorrhagic sarcoma of *Köbner*). Multiple sarcomas of the skin always appear in a characteristic form, as red spots which soon become nodules. The nodules increase in size and become confluent, thus forming a tumor which is at first movable over the underlying tissues. Later on the skin desquamates and becomes red, bluish or livid, then browner after repeated hemorrhages, and may finally ulcerate. The skin over pigmentary sarcomas is bluish black.

Besides the ulceration of the nodules, spontaneous resolution is possible, complete or partial, leaving a cicatrix. The nodular tumors may in some cases remain the same size for years. The tumors are always circumscribed, and are of soft or firm consistence according to their composition. Soft nodules tend to disintegration, hard nodules to atrophy and cicatrization. The former are very malignant and soon lead to death from glandular and organic metastases; the latter, by their multiplicity, after some years cause cachexia, which with metastases leads to a fatal issue. The skin of the whole body between the nodules is often of a dirty sallow color (Fig. 31). Small spots and elevations on the skin point to the development of fresh sarcomatous nodules.

Fig. 31. Sarcoma cutis multiplex.

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Sarcoma multiplex hemorrhagicum pigmentosum appears in the form described above, but first of all on the lower extremities, in the form of reddish nodules which often cause much itching. Tumor formation goes hand in hand with œdematous infiltration which extends over the whole leg and prevents the patient from walking. Desquamation of the skin on the surface of the nodules occurs along with cornification of the epidermis. Cicatrices form in the skin from atrophy of the nodules. Other regions of the body are unaffected, except the peripheral parts of the upper extremity. There is no enlargement of the lymphatic glands. The disease runs a progressive course, and in spite of the spontaneous resolution of some of the tumors, finally causes death by marasmus.

Microscopic examination shows a pure sarcoma with abundant blood-vessels, which often gives rise to organic metastases. As this form occurs exclusively in old people, arteriosclerosis may, perhaps, account for the origin and course of the disease. (*Köbner*, *Schlesinger*).

Differential Diagnosis. Primary multiple sarcomas must not be confounded with secondary sarcomatous growths in connection with a primary cutaneous sarcoma or a sarcoma of the internal organs. The tumors of mycosis fungoides are more likely to be mistaken for sarcoma, as they also develop from red, uneven spots, and form granulation tumors of a brownish-red color which in the later stages tend to ulceration and cachexia; but mycosis fungoides is of much slower growth than sarcoma. Syphilitic and tuberculous granulomas can hardly be confounded with sarcoma on careful examination.

Treatment. Preventive treatment of multiple sarcoma consists in the removal of all nævi which begin to take on rapid growth. In already existing

multiple pigmentary sarcomas excision is generally useless, and should only be performed when the tumors are few in number and the blood-vessels free from melanin. After excision of multiple sarcomas, especially melanosarcomas, death often follows from rapid dissemination and organic metastases. Hence the X-rays, large doses of arsenic (internally or subcutaneously) have been employed for multiple cutaneous sarcomas, in the same way as for mycosis fungoides. A permanent cure, however, is not to be expected as the prognosis of these multiple sarcomas is always bad.

Fig. 31 shows a case of multiple sarcoma of the skin affecting the whole of the thorax, abdomen and back. Some of the nodules have already atrophied leaving cicatrices. The new growth of nodules, however, exceeds the atrophy so that the patient became more and more cachectic in spite of treatment.

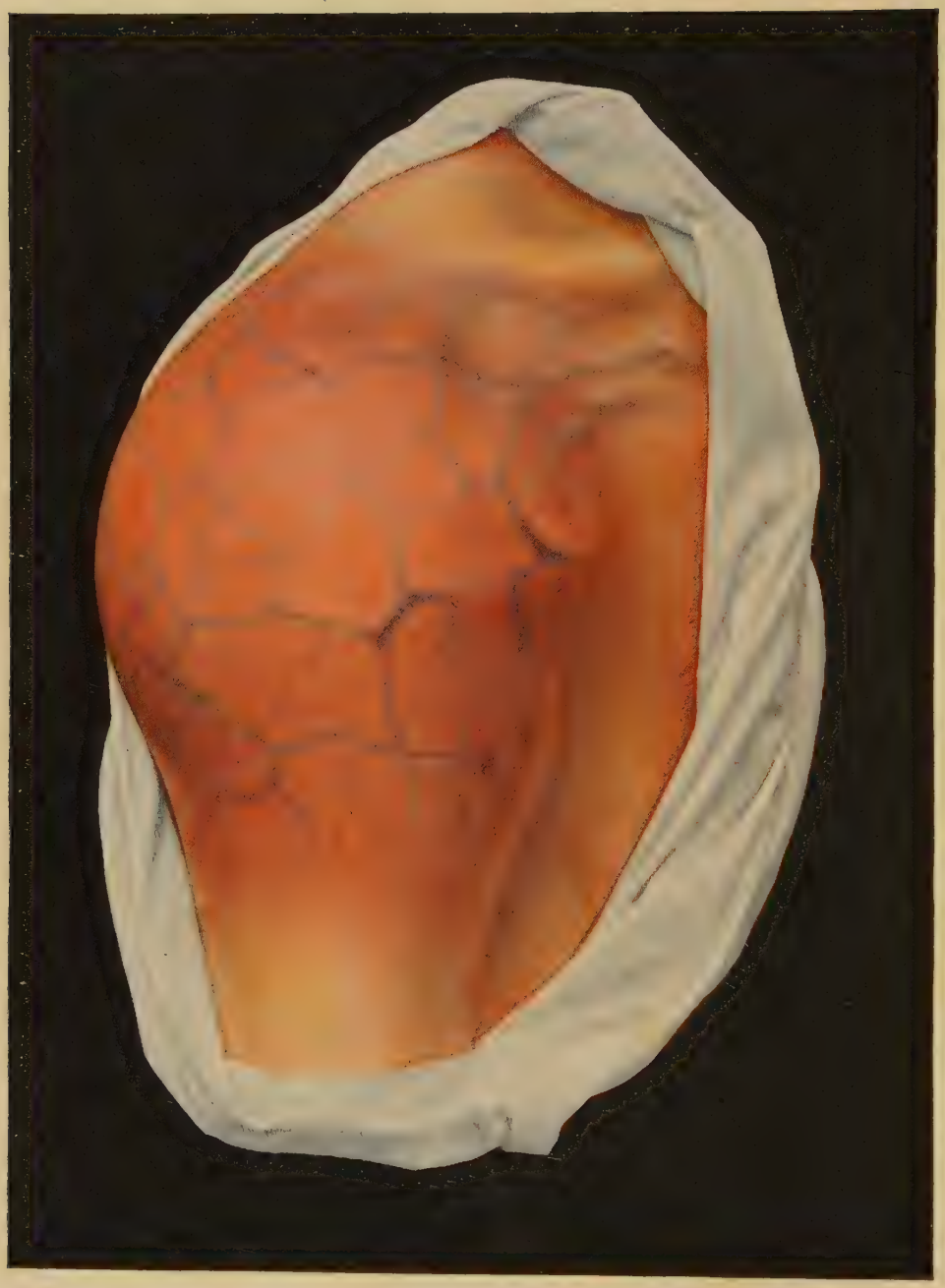

Fig. 32. Sarcoma humeri periphericum.

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SARCOMA HUMERI PERIPHERICUM

(*Peripheral Sarcoma of Humerus*)

Plate XXIV, Fig. 32.

Sarcomas arising from the bones are of special interest on account of their frequency.

Osteo-sarcomas are best divided into peripheral and central; the latter may arise from the cortical, spongy or medullary portions. Division into periosteal and myelogenous tumors is clinically impossible, and the word myelogenous may be replaced by osteal. Tumors which appear clinically to be periosteal often arise from the superficial layers of the cortex. By the use of the X-rays it is more easy to divide them into peripheral and central tumors; this leaves open the possible origin of the sarcoma from any part of the bone, and this can only be conclusively settled by section of the bone after removal. This classification is all the more rational because sections of preparations which were clinically regarded as periosteal sarcomas show that these arose from small foci in the medullary cavity. Periosteal tumors may extend into the medullary cavity and so simulate osteal tumors. In extensive tumors the origin of the tumor from any definite part of the bone cannot as a rule be established.

Both forms have special seats of predilection: in the long bones, the neighborhood of the epiphyses *e.g.* the upper end of the humerus (Fig. 32), the lower end of the femur, especially the internal condyle, the head of the tibia, the lower end of the radius; the flat bones, especially the scapula and bones of the skull. Both forms also grow in a globular form involving the whole circumference of the bone and

finally its whole thickness. They appear at puberty and during the whole period of growth, generally in young and robust individuals.

Both forms are distinguished by the fact that they soon break through their own capsule and that of the bones and then extend into the neighboring joints and muscles, especially the muscular insertions into the bones, and into the veins, forming eventually enormous tumors which break through the skin and appear as fungoid masses. The superficially situated tumors have a tendency to frequent hemorrhage and destructive inflammation. Primary sarcomas of bone are very rare and are sometimes confounded with sarcoma-like changes in the bones which result from ostitis fibrosa; also with formations which do not belong to tumors in the strict sense, but are known as myelomas (especially in the blood-forming vertebral bodies).

Microscopically, spindle cells are often found in peripheral sarcoma, and giant cells in central sarcoma. The other forms of sarcoma cells are also present.

The X-rays, in peripheral sarcoma, show little change in the cortex. In central tumors, especially those arising from the medullary cavity, they often show spherical transparent spaces in the interior, while the cortex is very thin and excavated—forming a shell—in the same way as in bony cysts, osteomyelitic abscesses, isolated tuberculosis and gumma.

In the early stages the diagnosis of osteo-sarcoma is difficult. The peripheral tumors are naturally more easy to diagnose, as they present a rapidly growing tumor firmly attached to the bone, with irregular boundaries towards the muscles. Rheumatic pains and effusion into the joints frequently occur when the tumors are situated near the joints. The nearer the sarcoma approaches the skin the easier it is to recognize the superficial tumor masses, which infiltrate the soft tissues, and consist of cells

only without bony infiltration. Swelling of the cutaneous veins occurs early from pressure of the tumor on the vessels (Fig. 32), while the skin becomes reddish brown, thin and almost transparent, especially when the tumor is attached to it.

Slow-growing central sarcomas can only at first be diagnosed by the X-rays, later on they present themselves as hard spheroidal swellings like billiard balls. The more they extend and approach the skin, the thinner becomes their bony shell, which finally gives the sensation of parchment crepitation, first described by *Dupuytren.* Central tumors are often first diagnosed by the occurrence of spontaneous fracture. Extensive forms, which assume a more spindle-celled formation are easy to recognize. Through growth of the tumor into the joints and muscles, typical functional derangements are produced, and separation of the epiphyses. Metastases in the lungs develop early. Disintegration of the tumor cells gives rise to fever, especially in rapidly growing, small, round-celled sarcomas.

Differential Diagnosis. Parosteal sarcomas are easily mistaken for peripheral sarcoma, and are often impossible to distinguish by the X-rays. They are often of very soft consistence, and were formerly called encephaloid.

Chondrosarcoma only occurs in the neighborhood of the joints and forms irregular nodular tumors (Fig. 34).

Sarcomas situated near the large vessels and pulsating with them, may be mistaken for aneurism, but the X-rays will assist the diagnosis. Central sarcomas have been wrongly considered as aneurism of the bone, owing to their vascularity and their reddish-brown color on section, which is due to frequent hemorrhages.

Myelomas are multiple and occur chiefly in the vertebræ.

Metastatic carcinomas, which occur especially in the neck of the femur after mammary carcinoma in women, and in the head of the humerus after carcinoma of the thyroid gland (*v. Eiselsberg*), must be diagnosed by the primary growth.

Osteo-sarcomas may possibly be confounded with inflammation of joints, rheumatism, osteo-myelitis, syphilitic and tuberculous processes; but in most cases the diagnosis can be made by the history of the case, by the X-rays, by anti-syphilitic treatment, and in osteomyelitis by search for hemolysin (*Bruck, Michaelis, Schultze*). The uninterrupted diffuse growth should always raise the suspicion of malignant tumor. In doubtful cases an exploratory incision may be made.

In all cases the prognosis is very bad. The harder forms of sarcoma (spindle-celled and giant-celled) sometimes have a better prognosis. The soft, round-celled sarcomas are the most malignant on account of their rapid growth and early metastasis.

Treatment. The earlier operative treatment is undertaken, the more likely is a radical cure.

Small, central sarcomas can be removed by the chisel, and the medullary cavity scraped. Larger circumscribed tumors still confined to the bone can be removed by free resection of bone. The defect can be repaired by bone grafting (auto- or heteroplastic).

If the sarcoma has already invaded the muscles amputation must be performed. When the tumor is near the joint of one of the bones of the extremities, disarticulation is necessary; when in a flat bone total extirpation.

Inoperable sarcomas are to be treated according to the rules for inoperable tumors (cf. Plate XVII).

Fig. 32 shows a peripheral sarcoma of the upper end of the humerus in a young individual. The

soft tumor has extended under the skin, in which the brown coloring and extensive network of dilated veins are very marked. The lower borders of the fusiform tumor are irregular and send processes here and there into the muscles. The tumor has destroyed the head of the humerus and has broken through into the joint, in which there is effusion. The function of the joint and upper arm is destroyed. The supra-clavicular glands are enlarged. Posteriorly the tumor has extended to the scapula region. The X-rays showed complete destruction of the upper part of the humerus. As there was no evidence of organic metastases, the arm and shoulder girdle (scapula and outer half of the clavicle) were removed after section through the middle third of the clavicle and ligation of the subclavian artery and vein. The axillary and supra-clavicular glands were also removed.

On section, the whole of the upper portion of the humerus was found to be transformed into a large tumor, the central parts of which were hard from bony infiltration, while the periphery was soft and fungoid. The tumor was a round-celled sarcoma, but it was too extensive to decide from which part of the bone it originated.

SARCOMA FASCIAE EXULCERATUM

(Ulcerating Sarcoma of Brachial Fascia)

Plate XXV, Fig. 33.

Fascia and the sheaths of blood-vessels are often the starting point of sarcomas; not only of pure round-celled and spindle-celled sarcomas, but more often of mixed forms—myxosarcoma and fibrosarcoma. Fibrosarcomas are characterized by their firm consistence and slow growth; they are frequently circumscribed and partly encapsuled. Myxosarcomas are characterized by their softness and rapid growth without encapsulation. The pure sarcomas appear as soft, many-celled, rapidly growing tumors, or in a harder form which is of slower growth and not so malignant.

In the early stages of fascial sarcomas (fascia of the arm, fascia lata, abdominal fascia) we find small tumors fixed to the fascia, but movable over subjacent tissues and under the skin. The skin is soon involved and becomes tightly stretched over the tumor and pigmented, and finally the tumor breaks through it. At the same time the muscles and eventually the whole section of the body are infiltrated with tumor substance (bones, joints, peritoneal cavity). The chief growth, however, takes place on the external surface in the form of nodular fungoid tumors which exhibit all the characteristics of sarcoma. They are of soft consistence, both in the center and at the periphery; the surface is much smoother than in carcinoma, bleeds easily on account of its numerous blood-vessels, and is covered with sanious discharge. Nodules succeed one another till an enormous cauliflower growth is formed (Fig. 33).

Fig. 33. Sarcoma fasciae brachii exulceratum.

Ulceration of the tumor is followed by regional glandular metastases, organic metastases, fever and severe anæmia.

Differential Diagnosis. These rapidly growing malignant tumors are so typical in their situation and development that it is only on the scalp that they can be mistaken for ulcerating carcinoma. Sarcomas of the scalp often have hard borders with deep fissures as in carcinoma, and also give rise to early glandular enlargement.

Treatment. Small, slow-growing sarcomas can be removed by free excision, but local recurrence is frequent. In extensive, and especially in ulcerated, tumors of the extremities amputation is indicated. Tumors which arise in the abdominal fascia often become inoperable owing to extension to the peritoneal cavity.

Fig. 33 shows a rapidly growing, recurrent, ulcerated sarcoma of the fascia of the arm. The younger nodules are covered by livid skin, which is intact in some parts and thin in others. In other parts there are white cicatrices left by former operations. The X-rays showed that the sarcoma had extended to the bone. Owing to the growth having broken into the elbow joint, this was fixed in the rectangular position. There were some small, soft, enlarged glands in the axilla. Amputation through the arm was performed, with removal of the axillary glands.

CHONDROMYXOSARCOMA—EXOSTOSES MALIGNAE

(*Malignant*)

Plate XXVI, Fig. 34.

Chondrosarcomas are situated on or near the joints. Most frequently they arise from the head of the tibia or the upper end of the humerus, also from the lower end of the radius. They may also originate from previous chondromas of the phalanges, metacarpal and metatarsal bones. They generally form large, nodular, hard tumors consisting of hyaline cartilage, osseous, mucoid and sarcomatous tissue and contain cystic cavities due to softening and hemorrhage. They then resemble in appearance benign, cystic chondrofibromas.

They often form rapidly growing tumors which destroy the bones and joints and give rise to sarcomatous metastases containing no cartilage. Their prognosis is, therefore, very bad. In young individuals they cause disturbance in growth (shortening, etc.). Spontaneous fractures are frequent in the forms which show an abundant development of sarcomatous tissue and much cystic degeneration. In chondromas arising from cartilaginous exostoses, which, like the chondromas of *Virchow*, are due to arrested development of the skeleton and disturbances in growth, chondrosarcomas may also develop. The tumors are so typical that they cannot be mistaken for other growths.

Fig. 34 shows a nodular tumor of almost bony hardness arising from the tibia. Some portions of the tumor are soft. The tumor has pushed forward under the skin, which has become thin and livid, and

Fig. 34. Chondromyxosarcoma — Exostoses malignae.

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is broken through in some places through which the tumor is beginning to discharge. The movements of the knee joint are very limited. No glandular or organic metastases were found.

Treatment. Removal of the sarcomatous exostoses, and resection of the joint, if necessary. In large tumors, amputation and disarticulation. Prophylactic treatment consists in the removal of rapidly growing exostoses and chondromas.

SARCOMA GIGANTO CELLULARE (*Giant-celled*)—EPULIS

Plate XXVII, Fig. 35.

The name epulis has been given to sessile or pedunculated fibrosarcomas with numerous spindle and giant cells, arising from the periosteum or alveolar connective tissue of the upper and lower jaw. They are hard or soft tumors according to the nature of the cells, with a smooth surface covered by mucous membrane, of rounded form and the size of a walnut. They grow rapidly in women during pregnancy. In rare cases they are ulcerated. In children and young people they occur equally in both sexes. They often arise in the spaces between the teeth, and then have the impressions of the neighboring teeth on their surface. Sometimes they develop from the lateral surface of the alveolus and then grow over the teeth, usually the molars, which they may loosen. They are very vascular and bleed easily, but cause no other trouble.

The tumors, although they are sarcomas, have usually a good prognosis, for their growth remains circumscribed, rarely involves the bone and gives rise to no glandular or organic metastases. They only assume a malignant character by their frequent recurrence after incomplete operations.

Differential Diagnosis. Polypi of the gums arising from alveolar fistula and bad teeth do not attain the size of epulis. The flaccid fibromas of the gum seen in leontiasis ossea do not form globular tumors, and are only slightly vascular.

Carcinomas occur at a later age, seldom arise

Fig. 36. Cavernoma linguae.

Fig. 35. Sarcoma gigantocellulare — Epulis.

from the alveolar border, and can easily be recognized by their hard borders, fissures, and glandular metastases.

Treatment. Epulis should never be removed with scissors. The part of the alveolar border from which it arises should always be removed with the chisel. Hemorrhage can be arrested by plugging with iodoform gauze after previous irrigation with hot saline solution, or by cauterization. Recurrence is rare after thorough removal.

Fig. 35 shows a soft tumor the size of a cherry arising from the alveolar border of the first right bicuspid tooth, in a young woman, which has grown rapidly during pregnancy. On the surface is a pin-point ulceration from which frequent hemorrhage has occurred. It was removed by chiseling the alveolar border.

HEMANGIOMA CAVERNOSUM LINGUAE

(*Cavernous Hemangioma of Tongue*)

Plate XXVII, Fig. 36.

Hemangioma cavernosum (cavernoma linguæ generally develops from a previous congenital hemangioma simplex, a slightly raised red spot which often remains unnoticed. It may also occur as a congenital tumor which becomes fully developed in adolescence or sometimes later, and extends more deeply than simple hemangioma into the mucous membrane and sub-mucous tissue. The tumor consists of new blood-vessels, especially capillaries, and cavities lined by endothelium and filled with blood. The cavernoma presents itself as a tumor with several small nodular projections on its surface, which have a bluish, glistening appearance. The mucous membrane in the region of the tumor is so thin that a dark fluid mass appears to be seen through it. Apart from this characteristic appearance, the softness of the tumor, and the fact that it can be emptied by pressure and made tense by bending the head are worthy of notice. It thus consists of cavernous tissue, such as is found normally in the corpora cavernosa penis, and on this account the name erectile tumor has been applied to it. Besides the superficial growth there is also a deeper growth into the mucous membrane, so that the tumor may involve the whole tongue, the floor of the mouth, the soft palate, the lips and the cheeks. Eventually the tumor may involve the whole side of the face and extend through the orbit to the brain. In other cases the tumors are encapsuled. Sometimes there are multiple encapsuled cavernomas lying

close together, but without any direct connection. Tumors which, arising from the buccal mucous membrane, appear under the skin of the face, give rise to thinning and a bluish glistening coloration of the skin. Apart from the deformity large cavernomas are dangerous, as they may rupture and give rise to profuse and sometimes fatal hemorrhage, as often occurs in cavernomas of internal organs (alimentary canal and liver). Sometimes ulceration occurs at the points of rupture, which may cause general septic infection, and in the tongue acute glossitis and œdema of the glottis.

Differential Diagnosis. Cavernous lymphangiomas are composed of larger protuberances and have a greenish surface. Moreover, lymphangioma, though diminished by pressure, remains independent of the circulation and is not increased by pressure, stooping or coughing. As the result of inflammatory changes, hard nodules form in these tumors, which are disseminated in the soft parts. Sarcomas are rare and can generally be recognized by their smooth surface and rapid growth. Retention cysts of the mucous membrane of the tongue are smaller, circumscribed, and have a uniform surface. On the other hand, they are also covered by thin, bluish, glistening mucous membrane.

Treatment. Simple hemangiomas of the mucous membrane should be removed by caustics or cauterization. Cavernous hemangiomas can be extirpated if they are encapsuled. Injection of perchloride of iron renders the boundaries of the tumor visible and prevents hemorrhage, but is dangerous on account of possible embolism.

Diffuse cavernous angiomas are best incised and scraped with the sharp spoon (*v. Bergmann*). Large vessels can be ligatured and the bleeding surface cauterized, treated with hot saline solution or tamponed

with iodoform gauze or sterile sponges. The operation must be repeated if recurrence takes place.

Inoperable tumors are best treated with injections of alcohol, or with Payr's magnesium. Both methods aim at thrombosis, after which shrinking of the tumor takes place. Injections must be made deeply under the mucous membrane to avoid necrosis.

Fig. 36 shows an encapsuled hemangioma arising from a simple cavernoma after puberty, with the characteristic changes described above. The tumor was treated by incision and scraping.

Fig. 37. Fibroadenoma mammae cysticum.

FIBRO-ADENOMA MAMMAE CYSTICUM

(*Cystic Fibro-adenoma of Breast*)

Plate XXVIII, Fig. 37.

Adenomas, distinguished as true tumors (from hyperplasias) by the irregular arrangement of the newly formed glands, are rare in the breast, like pure fibromas. Of the benign tumors of the breast only fibro-adenomas come into consideration, as other tumors are very rare (myxoma, angioma, chondroma, and mixed tumors).

Fibro-adenomas usually develop in the peripheral portions of the mammary gland in young women, in the form of slow-growing, nodular tumors, which are so well encapsuled that they are freely movable within the breast. They are rarely multiple and seldom affect both breasts. When there is an abundant development of connective tissue the tumors are firm; when cystic cavities develop they are soft and fluctuating (fibroadenoma cysticum).

The tumor described as cystadenoma papilliferum, fibroma intracanaliculare, and incorrectly as sarcoma phyllodes, which is formed by connective tissue processes covered by epithelium projecting into the cavity of the cyst, belongs to the group of benign mammary tumors. In older women, especially at the menopause, small multiple cystadenomas occur, chiefly in the region of the nipple, without causing retraction; sometimes in both breasts. These feel like solid tumors owing to their thickened walls. The name of chronic cystic interstitial mastitis has been given to these tumors by *König*.

The benign nature of these tumors is shown by the fact that they cause neither glandular nor organic

metastases. On the other hand, these tumors, especially cystic fibroadenomas, after slow increase in size may become enormous growths, as large as a man's head, and then cause much inconvenience by their weight, and also radiating pains in the arm. Moreover, there is a possibility of a transformation into carcinoma or sarcoma.

Differential Diagnosis. Chronic interstitial mastitis may give rise to a nodular infiltration of the mammary gland, but this disappears under treatment by cleansing the nipple, injection of alcohol into the nodules, and suspension of the breast; in distinction to the steady growth of tumors. Cysts occur chiefly in the neighborhood of the nipple, from which a brownish fluid can be expressed. When they appear under the skin they can be recognized by their bluish, glistening surface. Metastatic tumors which, as in carcinoma, especially occur in the generative organs, are often only to be distinguished by the presence of the primary tumors and cachexia, for they appear in the form of encapsuled movable nodules like benign tumors, and are also of slow growth. Thus, an encapsuled tumor in the breast proved to be a metastasis of a chorionepithelioma of the uterus, in one of the author's cases. Primary carcinomas, especially scirrhus forms in old women, are recognized by their hardness and irregular borders (cf. Plates V–XI).

Treatment. The tumor should be exposed by an incision radiating from the nipple (but avoiding it) and extirpated with the adjacent mammary tissue. Early removal of all chronic nodular formations in the breast is advisable. In doubtful cases an exploratory incision may be made. Large tumors can be removed subcutaneously by raising the breast through a curved incision at its lower border (*Kocher*). In very extensive growths, especially cystic fibroadeno-

mas and multiple cystic formations, the whole breast should be removed.

Fig. 37 shows the right breast of a woman (at the menopause) much more projecting than the left. The upper half of the right breast is involved in a tumor, the irregular surface of which can be recognized by the bulging of the skin. The skin is thin and reddened. The tumor, which was at first remote from the nipple in the inner and upper quadrant of the breast, has grown towards the nipple without causing retraction. The tumor is completely encapsuled, freely movable, and of moderately hard consistence. It was removed through a radial incision, together with the adjacent mammary tissue.

CORNU CUTANEUM (*Cutaneous Horn*)
ADENOMA SEBACEA (*Sebaceous*)
Plate XXIX, Fig. 38.

Cutaneous horns occur more frequently in old people (senile keratoma), and in those subject to exposure (sailors, etc.). They arise on the basis of sebaceous and dermoid cysts and warts, and occur on the eyelids, nose, lips, cheeks and ears, also on the scalp and genital organs. They are seldom multiple. They generally form sessile, freely movable, curved or spiral structures which have an irregular, grooved, yellowish-brown surface and a horny consistence.

These benign formations, which may attain the length of several centimeters, are formed by a proliferation of the horny layer of the epidermis. The papillæ are also lengthened, which accounts for the soft consistence of the interior.

Differential Diagnosis. In young people multiple nævi with cornification occur, but these have a wider base, and a flatter and more prickly surface,

Treatment. As about 10 per cent. of cutaneous horns develop into carcinoma, excision by the knife into the healthy skin is indicated. Recurrence takes place after removal by ligature.

Fig. 38 shows a slightly curved cutaneous horn about one and one-half centimeters long, occurring in an old countrywoman, in the zygomatic region, with all the characteristic features. The skin at the base of the growth is scaly and somewhat reddened.

Adenoma of the skin is another form of growth often occurring in women, both young and old,

Fig. 39. Endothelioma cutis.

Fig. 38. Cornu cutaneum — Adenomata sebacea.

usually on the face. Adenomas are benign tumors which develop from normal glandular tissue, and may, therefore, occur in all glands. Adenomas which develop in places where glands are normally absent must be assumed to develop from congenital rudiments of supernumerary glands.

In the skin, adenomas often develop from the sebaceous glands (adenoma sebaceum). They often occur in many places as small, round, flat, circumscribed, encapsuled, movable tumors, of firm consistence, and with a dirty gray surface. The lymphatic glands are never affected, and there is no recurrence after extirpation. Adenomas which have become transformed into carcinomas have been incorrectly termed malignant adenomas.

Differential Diagnosis. Intercurrent cystic formation may cause confusion with endothelioma of the skin, and ulceration with carcinoma. The occurrence of calcification in the adenoma may make it as hard as carcinoma. Doubtful cases must be settled by microscopic examination.

Treatment. Small multiple adenomas can be treated by cauterization or X-rays. Larger ones should be extirpated.

Adenomas arising from the sweat glands (adenoma sudiporum) generally form larger, more nodular tumors, which after ulceration simulate carcinomas. The treatment consists in excision.

Fig. 38 shows multiple pin-point adenomas of the sebaceous glands, which disappeared to a great extent under treatment by X-rays. Characteristic smegma-like matter can be expressed from larger adenomas.

ENDOTHELIOMA CUTIS (*of Skin*)

Plate XXIX, Fig. 39.

Endotheliomas (*Golgi*) arise from the endothelium of the blood-vessels and lymphatics, which, according to *Borst* consists of specially modified connective-tissue cells. Owing to the double nature of the endothelium, it is not surprising that those who regard the endothelial cells as epithelial cells give the name of endothelial cancer or connective-tissue cancer to the tumors arising from it, while others, who regard the endothelial cells as connective-tissue cells, call these tumors endothelial sarcomas, plexiform angiosarcomas (*Waldeyer*) and angiosarcoma (*Kollaczek*).

If we hold with *Borst* that the endotheliomas arise from the endothelium, *i.e.* from the connective-tissue cells, which may assume all kinds of modifications, it follows that tumors of varied structure may arise from these different varieties of endothelium, which have the appearance of fibroma, sarcoma or carcinoma, as the latter forms stratified globes, but without cornification. By this means we avoid the endless number of names given to these tumors, and have clinically only the term endothelioma, to be distinguished microscopically as hemangio-endothelioma and lymphangio-endothelioma, which we can designate as alveolar, plexiform or vascular, according to their microscopic structure. *Borst* also includes the basal-cell cancers (regarded as carcinoma by *Krompecher* and *Cönen*) among the endotheliomas as these tumors have no cornification (cf. Plate II, Fig. 4).

It is no wonder that these tumors may appear clinically in the most varied forms and be confounded

with fibromas, adenomas, sarcomas and carcinomas.

The tumors may arise from all kinds of endothelium and are most frequently observed in the skin of the face, the mucous membrane of the mouth and pharynx, the bones of the face and skull, the peritoneum, the pia mater of the brain and spinal cord, and the parotid gland.

Occurring at any age, they form encapsuled, generally slow-growing, comparatively benign tumors which seldom cause glandular or organic metastases, but have a tendency to local recurrence.

As the shape, surface and consistence of the tumors may assume all possible varieties, the clinical signs of endotheliomas are very indefinite. The shape is often irregular, especially in endothelioma of the face (Fig. 39, horseshoe shape). The surface may be smooth, irregular or ulcerated. The consistence may be hard, soft or cystic. Sometimes the tumors are very vascular and the epidermis assumes the reddish-brown coloration which is seen in sarcoma, at other times they are poor in vessels. Although they are at first encapsuled they may later on give rise to a diffuse infiltration of the tissue along the endothelial clefts, and then have irregular boundaries.

Differential Diagnosis. Sarcoma and carcinoma are most often confounded with endothelioma, also fibroma and adenoma, especially when they undergo cystic degeneration or ulceration. The diagnosis can often only be made by microscopic examination.

Treatment. Early excision is indicated, as transformation is possible in rapidly growing tumors. In the diffuse forms, which represent malignant tumors like carcinoma and sarcoma, extensive operations are necessary. When multiple nodules develop in the

extremities amputation is sometimes necessary. Metastases in the lymphatic glands, which appear in the form of soft nodules, should also be removed.

Fig. 39 shows a horseshoe-shaped endothelioma of the zygomatic region, in an old woman. The tumor is situated in the skin and has grown out of it. It is movable over the subjacent tissues. The borders are regular on all sides. The skin over the tumor is reddish brown like sarcoma, very thin, and cannot be raised from the tumor. It shows numerous fine ramifying vessels. In the middle of the horseshoe is an ulcer which resembles a carcinoma planum, but the latter, as previously mentioned, occurs chiefly at the junction of skin and mucous membrane. There are thus resemblances to both carcinoma and sarcoma. The soft borders, the circumscribed form and soft consistence, and the absence of glandular affection, show the benign nature of the tumor. In endothelioma of the face the occurrence of small multiple cysts in the cutaneous covering is more common than ulceration.

Excision of the tumor and repair of defect by a plastic operation. Microscopic examination showed it to be a plexiform hemangio-endothelioma.

Fig. 40. Endothelioma parotidis — Tumor mixtus.

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ENDOTHELIOMA PAROTIDIS (*of Parotid*)
TUMOR MIXTUS (*Mixed Tumor*)
Plate XXX, Fig. 40.

Mixed tumors occur frequently in the parotid, less often in the other salivary glands. These parotid tumors are regarded as endotheliomas by *Kaufmann*, *Nasse* and *Volkmann*, which is intelligible after the explanation of endothelioma given in Plate XXIX, Fig. 39, if we assume that the epithelioid tracts occurring in the tumors arise from endothelium, the latter, according to *Volkmann*, being also capable of forming cartilaginous, mucoid and connective tissue. Others hold that these mixed tumors, which also occur in the breast, kidneys and testicles, arise from epithelial and connective-tissue cells (*Wilms* and *Hinsberg*).

On section, the tumors show a very variegated structure, in which are found parts resembling carcinoma and sarcoma, mucoid tissue, cartilage, cysts, calcification and ossification.

Parotid tumor occurs more often in young individuals, and appears as an encapsuled, smooth or nodular tumor, movable over subjacent parts, lying under the fascia, and covered by intact non-adherent skin. The rare tumors which lie above the parotid fascia originate in aberrant parotid rudiments, according to *Bergmann*. The consistence of parotid tumors may be hard, soft or cystic, according to their composition, and may differ in different parts of the same tumor. At first they are of slow growth, but may suddenly take on rapid growth, rupture their capsule, infiltrate the surrounding parts like malignant tumors, and finally perforate the skin and

ulcerate. In such cases there are glandular and organic metastases.

Tumors arising from the anterior part of the parotid cause swelling of the cheek; those arising from the posterior part of the gland raise up the external ear. Larger tumors may extend towards the chin, the nape of the neck and the clavicle.

Small tumors cause hardly any pain, but sometimes salivation. Extensive tumors may give rise to pain in the ear, deafness and facial paralysis.

Differential Diagnosis. The more common cartilaginous tumors with uneven surface are easy to distinguish from other growths, but the soft tumors with smooth surface may be confounded with lymphomas, cavernomas, lipomas and cysts. Extensive endotheliomas are often indistinguishable from sarcomas or carcinomas.

Mixed tumors should be extirpated as early as possible, on account of the possibility of their taking on malignant growth. Both benign and malignant recurrence may take place from the remains of the capsule after removal of tumor. The capsule must, therefore, be completely removed during extirpation, taking care to avoid large branches of the facial nerve, while the part of the gland which is unaffected can be left behind. In extensive malignant endotheliomas of the parotid it is hardly possible to save the facial nerve, for in these cases the whole gland must be removed. In tumors of the submaxillary gland the whole gland should always be removed.

Fig. 40 shows a mixed tumor of the parotid which slowly developed during three years in a woman aged thirty. Profuse salivation, and latterly rapid growth of the tumor, led the patient to seek advice. The skin is freely movable over the tumor and shows a fine network of vessels. The tumor lies under the fascia and has spread to the anterior and lower

region of the ear. The surface of the tumor is irregular; the consistence of the posterior portion, where the surface is uneven, is hard; soft and fluctuating in the anterior portion, where the surface is smooth. There is no projection of the tumor into the buccal cavity. The tumor is freely movable over the subjacent parts, and there is no glandular enlargement.

The tumor was extirpated with its capsule, and the facial nerve avoided. Part of the parotid gland was left behind. On section, cartilage, cysts, calcification, and fibrous and sarcomatous tissue were found.

GANGLION CARPALE (*of Wrist*)

Plate XXXI, Fig. 41.

Ganglions occur especially in connection with the joints of the hand, most often on the dorsal surface between the extensor carpi radialis and extensor indicis, less commonly on the palmar side near the flexor carpi radialis (especially in pianists); also on the dorsum of the foot at the joints of the cuboid bone and in the neighborhood of the knee joint.

Colloid degeneration of the joint capsule and the periarticular connective tissue gives rise first to multilocular, then unilocular cystomas, which were formerly regarded as retention cysts. Ganglions of the tendon sheaths arise in a similar manner, but are smaller; they occur chiefly in the sheaths of the flexor tendons over the metacarpo-phalangeal joints, and cause neuralgic pain by pressure on the digital nerves. They often occur after rowing and fencing, *i.e.* from traumatic causes.

Spherical ganglia occur most commonly on the dorsal aspect of the hand in young women, and resemble exostoses on account of their hardness. They often cause neuralgic pains and slight trouble in the movements of the joints.

Ganglions are of slow growth, the skin is unaltered and movable over them; the surface is smooth or slightly wrinkled. The consistence is hard in small ganglions, soft and fluctuating in larger ones. In pedunculated ganglions there is slight mobility over the joint.

Differential Diagnosis. In the knee joint they may be mistaken for affections of bursæ; in the

Fig. 42. Bursitis praepatellaris acuta.

Fig. 41. Ganglion carpale dorsale.

foot for ganglions of the tendon sheath. Tuberculous teno-synovitis is distinguished by its nodular surface and by spreading along the tendons.

Treatment. They may be cured by breaking them with a wooden hammer and then compressing with a bandage. Subcutaneous discission, puncture, injection of alcohol, etc., and even incision do not always prevent recurrence. A permanent cure can be obtained by extirpation of the ganglion with its pedicle. This involves opening the joint, with which they often communicate, or are only separated from it by a thin membrane; hence strict asepsis is necessary.

Fig. 41 shows a ganglion in a typical situation in a young girl, which recurred after being broken. Extirpation of the ganglion resulted in cure. The unilocular cyst contained colloid matter. The presence of septa gave evidence of an earlier multilocular structure.

BURSITIS PRAEPATELLARIS ACUTA

(*Acute prepatellar Bursitis*)

Plate XXXI, Fig. 42.

Affections of the bursæ may be divided into acute and chronic inflammations, and further into purulent and non-purulent (serous, fibrinous, hemorrhagic).

An acute bursitis occurs especially after injuries and inflammation extending from neighboring regions (furunculosis, arthritis). It may also arise from foreign bodies inside the bursa.

In acute serous bursitis the skin is unchanged, while in purulent bursitis it is red and œdematous. In the latter, suppuration often extends beyond the limits of the bursa and is accompanied by fever, pain and difficulty in movement. Under the movable skin, in the case of superficial bursæ (*e.g.* the prepatellar), a hemispherical, tense, sometimes fluctuating, slightly movable swelling with a smooth surface can be felt, limited to the anatomical position of the bursa (Fig. 42).

Chronic bursitis, also called hygroma, occurs more after chronic irritation, in the prepatellar bursa, in housemaids, for instance (housemaid's knee), and in the olecranon bursa in miners (miner's elbow). Villous proliferations in the wall of the bursa lead to thickening, and to the formation of rice bodies. The skin over the bursa is movable and thickened. The hygroma is almost spherical, with a rough, uneven surface.

Hygroma may also develop in adventitious bursæ, especially in places where a bone is subjected to pressure, for instance, on the toe over a clavus. Hygromas give rise to little inconvenience, and only

hinder movement when of large size. In the case of the elbow there is sometimes neuralgic pain from pressure on the ulnar nerve.

Differential Diagnosis. The different forms of bursitis may be mistaken for arthritis of the adjacent joint, owing to limitation of movement, *e.g.* subdeltoid and sub-trochanteric bursitis. The strict localization of the affection to the anatomical position of the bursæ should make the diagnosis easy. Disease of several bursæ is chiefly observed in tuberculosis, syphilis, gonorrhea and gout.

Treatment. Acute purulent bursitis requires early incision and plugging, as infection of the joint may take place. In acute serous or hemorrhagic effusion, puncture and injection of 4 per cent. carbolic lotion, 1 per cent. iodoform-glycerin or absolute alcohol may be tried. In chronic bursitis, painting with iodine is generally useless. It is best to extirpate chronic hygromas, especially when they are large or have thick, hard walls, or when fistulæ develop, taking care to avoid the joints.

Fig. 42 shows an acute purulent prepatellar bursitis. The skin is red and hot and the movements of the knee joint are painful and limited. The tense, fluctuating, spheroidal swelling is clearly situated in front of the patella. The surface is smooth and regular, but the tumor is almost immovable over the subjacent structures. It was shown by incision that all three bursæ—subcutaneous, subfascial and subaponeurotic—were full of pus and in communication with each other.

HYGROMA GENUS MULTILOCULARE

(*Multilocular Hygroma of the Knee*)

BURSITIS PRAEPATELLARIS ET BURSITIS PRAETIBIALIS

(*Prepatellar and Pretibial Bursitis*)

Plate XXXII, Fig. 43.

This figure shows a case of chronic inflammation of the prepatellar bursa and the lower half of the pretibial bursa, occurring in a man who had to do his work in the kneeling position. The skin over the prepatellar bursa is thickened and movable over the cystic swelling. The walls of both hygromas are thickened. They are only slightly movable over the subjacent structures. Pressure on one hygroma causes some of its fluid to pass into the other, so that the two bursæ communicate. Total extirpation was performed owing to the extent of the hygroma and the thickened walls.

Fig. 43. Hygroma genus multiloculare.

Fig. 44. Struma cystica.

STRUMA CYSTICA (*Bronchocele*)

Plate XXXIII, Fig. 44.

Goitre occurs endemically (Switzerland and other regions) and epidemically in barracks and boarding houses (Strumitis acuta first observed by *Kussmaul*). Heredity, frequent congestion of the blood-vessels of the head, pregnancy, the nature of the soil, water and atmosphere have all been suggested as causes of bronchocele.

Bronchoceles occur twice as often in females as in males (*Schrötter*). Clinically, they are divided into diffuse and circumscribed forms, and pathologically into follicular, colloid, vascular and cystic bronchoceles.

In all cases the typical situation corresponds to the anatomical position of the thyroid gland, and the symptoms are definite. Even small bronchoceles cause marked and early deformity. Further extension results in pressure on the veins, causing prominence of the cutaneous veins and a cyanotic appearance of the face. Pressure on the trachea may give rise to displacement, stricture and changes in its walls, causing it to assume the form of a saber-sheath. This dangerous condition can be seen by the X-rays. Eventually the wall of the trachea may become so much destroyed as to give way after violent movement of the head. Difficulty in breathing during inspiration, causing stridor, is the necessary result, and sudden asthmatic attacks, occurring during violent movements of the patient or during sleep may prove fatal. Pressure on one recurrent nerve is of little consequence and often unnoticed, for unilateral paralysis of the recurrent is compensated,

so that hoarseness is often absent, and the condition is only shown by laryngoscopic examination. Bilateral paralysis of the recurrents is, however, very dangerous, as it may give rise to asphyxia or pneumonia. Small fibrous tumors arising in the middle line from the isthmus of the thyroid, and those lying behind the sternum cause more characteristic symptoms than large, soft tumors, which often cause little trouble.

Every bronchocele moves with the thyroid on swallowing and is thus distinguished from other affections.

The simplest form of bronchocele, which consists in a hyperæmia of the whole organ, is common in young girls at the onset of menstruation, or at the first sexual intercourse, and appears as a soft, uniform swelling of the whole gland, which may disappear spontaneously.

According to *v. Eiselsberg*, this simple form may often give rise to follicular hypertrophy. The latter also occurs in young individuals in the form of hard nodules in the gland, which may also disappear.

More marked enlargement of the thyroid gland, developing gradually in middle age, and leading to the formation of a horseshoe-shaped tumor involving the whole gland and consisting of a number of large nodules, is diagnostic of colloid bronchocele, while the vascular bronchocele is characterized by pulsation and compressibility. The cystic bronchocele (Fig. 43), arising from several colloid nodules owing to hemorrhage and liquefaction, forms small, hemispherical tumors with a smooth surface and distinct fluctuation. When the cyst walls are hardened by calcification the diagnosis is more difficult, but differs from the irregular, nodular formation of fibrous bronchocele. Cystic bronchoceles may attain the size of a man's head.

The different varieties—colloid, cystic, vascular and fibrous—may all occur in the same tumor.

The diagnosis of the different kinds of bronchocele

is important with regard to treatment, which should be begun early, as cardiac symptoms occur in connection with long-standing large bronchoceles.

Differential Diagnosis. An accessory bronchocele is easily diagnosed when it is fixed to the thyroid by a pedicle, as it then gives rise to the same symptoms. Bronchoceles which arise from free accessory glands may be mistaken for other tumors of the neck —lymphoma, sebaceous cyst, dermoid or malignant tumor.

Carcinoma of the thyroid gland occurs in old people and forms a nodular, very hard, rapidly growing tumor, which soon surrounds the whole neck with a hard ring. The diagnosis is settled by the glandular metastases, the early appearance of paralysis of the vocal cords and cachexia. In old people, the sudden occurrence of rapid growth in an old-standing bronchocele always suggests malignant transformation.

Sarcomas, which occur in young people as rapidly growing tumors, are distinguished by their soft consistence and by their diffuse infiltration. They often break through the capsule and give rise to severe hemorrhage.

Basedow's disease (*Grave's* disease, exophthalmic goitre), which, according to *Möbius*, consists in hypersecretion of the thyroid gland resulting in intoxication of the organism, is distinguished from ordinary bronchocele by the presence of tachycardia, tremor, exophthalmus and neuropathic conditions. The swelling in *Basedow's* disease is always very vascular and often pulsates. In long-standing bronchoceles symptoms of *Basedow's* disease may appear, but they are never so marked as in the genuine form; all the other characteristic symptoms of bronchocele are also present.

Mediastinal tumors and aneurisms are occasionally mistaken for retrosternal bronchocele.

Treatment. The treatment varies according to the nature of the bronchocele.

In countries where goitre is epidemic, prophylaxis plays the chief rôle. Water should only be drunk after boiling. Violent exertion should be avoided, on account of causing a determination of blood to the head.

In acute hyperaemia and follicular hypertrophy iodine preparations are most useful — iodide of potassium, or thyroid tabloids containing iodine (to be given carefully on account of tachycardia). Iodine preparations should not be continued too long.

In cystic and colloid bronchoceles iodine treatment gives no results, and operation is indicated—partial extirpation in the case of colloid bronchocele. Sufficient thyroid gland tissue must be left otherwise tetania strumipriva or myxœdema may follow.

Cretinism, which is only observed in countries where goitre is endemic, and causes changes in the skin, disturbance in growth and idiocy, is also due to degeneration of the greater part of the thyroid gland or absence thereof in the cretins themselves or in their parents.

In post-operative tetany, cachexia strumipriva, myxœdema and cretinism, implantation of a piece of human thyroid gland in the diseased subject may be attempted (*Kohn, v. Eiselsberg, et al.*). It is best to transplant a large piece into the spleen (*Payr*).

Isolated cysts and nodules can be enucleated. Recurrence after operation is rare on the whole and then usually causes no trouble.

In *Basedow's* disease ligation of the superior and inferior thyroid arteries has been successfully tried. (*Rehn, v. Bergmann*). The operation is not without danger, so that others have preferred internal treatment with arsenic, or by the galvanic current, etc., often successfully.

Fig. 43 shows a tumor the size of a walnut, in an old woman, which is easily recognized as a cystic bronchocele by its rounded form, regular outline, situation in the isthmus of the thyroid and its movement during swallowing. The tumor was enucleated on account of its causing considerable difficulty in respiration.

PAPILLOMA CUTIS INFLAMMATORIUM

(*Inflammatory Papilloma of Skin*)

Plate XXXIV, Fig. 45.

Papillomas or villous tumors, also occurring on mucous membranes as villous polypi, belong to the group of fibro-epithelial tumors (*Borst*). They consist of vascular connective tissue and epithelial proliferation (squamous more often than cylindrical) and simulate in structure the papillæ of the skin and mucous membrane. These growths represent a special group of tumors, and must not be confounded with papillomatous proliferations found in a similar form in nævi, carcinomas, sarcomas and endotheliomas. Condylomata acuminata are also very similar to papilloma; however, these are not true tumors, but are due to hyperplasia of the papillary body and its epithelial covering. These generally occur as the result of chronic inflammatory irritation from gonorrheal discharge, on the penis, vagina and anus.

True papillomas generally form small superficial tumors of a warty or conical form, single or multiple, occurring at any age, in places exposed to much irritation (skin, genitals, thighs, back, tongue, rectum, bladder and larynx). They are slow-growing, circumscribed, sessile or pedunculated, freely movable, non-infiltrating growths. Papillomas of the skin are yellowish-white dry growths, hard from cornification of the superficial epithelial layers, and form conical or wart-like projections.

Papillomas of the mucous membrane have a reddish fleshy appearance, and on account of their vascularity, bleed easily and are of soft consistence. In the larynx, they occur especially in the region of the

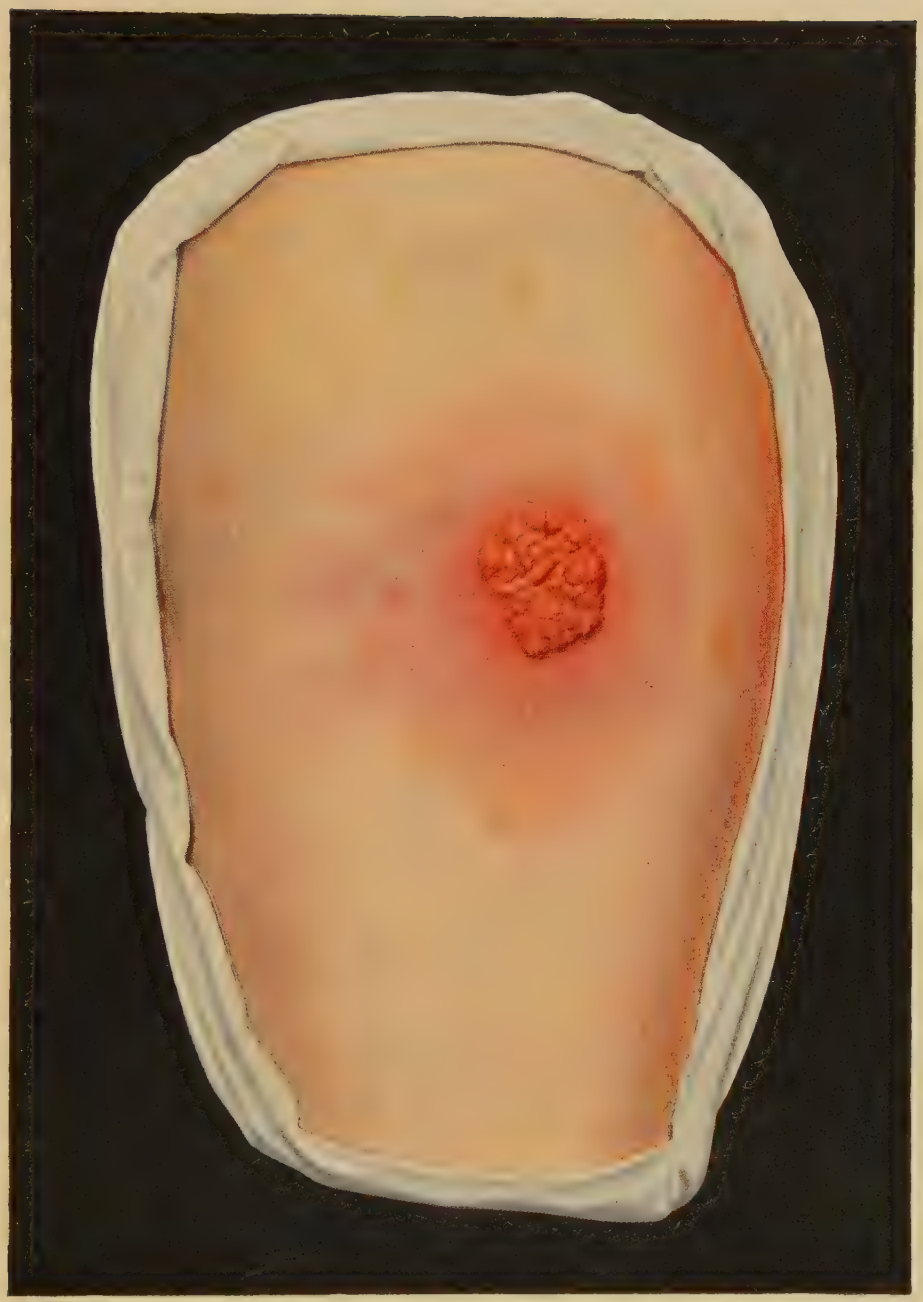

Fig. 45. Papilloma cutis inflammatorium.

vocal cords; they are often multiple in young individuals, prone to recur, and may lead to stenosis. Transition into carcinoma may occur, and is recognized by rapid growth, ulceration, infiltration, and growth into the deeper parts.

Differential Diagnosis. Small papillomas of the skin may be mistaken for common warts. In distinction to carcinoma they present the usual characteristics of benign tumors—soft consistence, free mobility, and no glandular metastases. Papillomas of mucous membranes are usually characteristic formations. It is only in villous polypi of the bladder, which may become transformed into villous cancer, that the diagnosis is difficult.

Treatment. Excision. Extensive operations are often necessary for the removal of papillomas of the mucous membranes (tracheotomy, colostomy, etc.).

Fig. 45 shows a cutaneous papilloma, freely movable over subjacent parts, of moderately soft consistence, and covered with warty projections. The horny layer and the surface of the skin has been destroyed by frequent cauterization. The surface is covered with a yellowish fetid secretion, and between the villous projections are deep depressions caused by ulceration, so that the appearance in some places resembles carcinoma; but the borders are not hard. The skin round the tumor is red and painful from cauterization.

After disinfection of the surface and arrest of the discharge, the tumor was excised in healthy tissue and the wound closed by suture.

Dermoids

RECURRENT DERMOID
Plate XXXV, Fig. 46.
DERMOID—PHIMOSIS—BALANITIS
Fig. 47.
DERMOID CYST
Plate XXXVI, Fig. 48.

True dermoid cysts are formed from the epiblast only, while compound dermoid cysts include all three embryonic layers. (Teratoma, Fig. 146).

As pure dermoid cysts arise through invagination of the epiblast they must be congenital, and can only occur where there were folds, furrows or recesses in embryonic life, or in places where organs are developed by invagination of the epiblast. These tumors are, therefore, of embryonic formation.

Dermoid cysts occur in the cutaneous and subcutaneous tissue in the region of the head (occipital, parietal and temporal bones); in the region of the face (root of the nose and orbit); in the neck (remains of branchial clefts); at the umbilicus; and in the coccygeal region as fissural dermoid cysts. The occurrence of dermoids in the cranial cavity, vertebral canal, thoracic cavity, abdominal cavity, retroperitoneal tissue, kidneys (*Wolffian* duct) is explained by the development of organs by invagination of the epiblast.

Dermoid cysts of the testicles and ovaries, on account of their complicated structure, are not pure dermoids.

Pure dermoids are unilocular or multilocular cysts, the external walls of which consist of connective

Fig. 46. Dermoid — Recidiv.

Fig. 47. Dermoid — Phimosis.

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tissue, and are connected with the surrounding tissues while the internal surface resembles skin (hence the term dermoid), and presents papillæ, squamous epithelium and hair. Those dermoids which contain bone, cartilage and teeth are formed at a very early embryonic period, before differentiation has taken place.

The contents of the cyst consist of a yellowish-white, caseous, odorless, fatty mass, mixed with numerous hairs, the appearance of which varies according to the situation of the dermoid (in the region of the eye, eyelashes, etc.). The contents are rarely serous or hemorrhagic. In the cutaneous or subcutaneous tissue the cysts form spherical or hemispherical tumors with a smooth surface and tallowy consistence. They are covered by intact skin, and are often attached to the bones. The superficial dermoids usually occur in youth. They are slow-growing and painless, and about the size of a walnut. Sometimes fistulæ form from which hairs protrude. The diagnosis of superficial dermoids is easy to establish by the above signs.

Differential Diagnosis. Superficial dermoids may be mistaken for sebaceous cysts, but the contents of the latter are foul smelling and more dirty yellow. If scars are present (*e.g.* after operations, Fig. 46), the history or microscopic examination only can decide whether it is a traumatic (post embryonic) formation caused by proliferation of an involuted part of the skin—the so-called epithelial cysts. These may also form round a foreign body. Epidermoids can often only be distinguished from dermoids microscopically, the former being lined with squamous epithelium, but containing no sebaceous or sweat glands or hair. At the root of the nose there is a similarity to encephalocele (Fig. 46). In the neck, dermoids may be mistaken for lipomas, lymphomas and branchiogenous cysts.

Dermoids of the umbilicus, on account of their hardness, may be mistaken for malignant tumors, but they are of slow growth and circumscribed. Dermoids of the abdominal walls are often mistaken for sarcomas and fibromas, but the latter are rapidly growing tumors, and often not encapsuled.

Deeply situated dermoids of the various cavities and organs, which are often only noticed accidentally, cannot as a rule be distinguished from other tumors.

Treatment. Extirpation of the whole cyst is necessary, as recurrence takes place if any part is left behind. Commencing carcinoma has been observed in the inner surface of the cyst wall (*Wolff*).

Fig. 46 shows a dermoid of the forehead, where it is often observed, either above the root of the nose, the inner angle of the eye, or laterally near the glabella (fissural dermoid cyst). The skin is movable over the tumor, which was observed in early youth, and shows a small white scar left by a former insufficient operation. The surface of the tumor is smooth and hemispherical. At the periphery there are raised bony walls. The tumor slowly attained its present size after the former operation and then remained stationary. There is no diminution on pressure over the tumor. It is of doughy consistence and only slightly movable over the subjacent bone.

Lipomas occurring on the forehead and having a smooth, not lobulated surface, may resemble dermoids. However, they are not congenital, have no bony ring round them, and are freely movable.

Encephalocele (which may be naso-frontal, naso-ethmoidal, or naso-orbital) is also a congenital tumor, but generally attains a much larger size, diminishes on pressure, and has no bony ring round it.

On account of the scar in the skin an epithelial cyst might be thought of; however, this is not congenital but occurs later as the result of trauma.

Fig. 48. Dermoid — Cystis.

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Sebaceous cysts are recognized by their superficial position in the skin.

This case was cured by extirpation.

Fig. 47 shows a dermoid of the prepuce, situated symmetrically on both sides of the raphe, and present since birth. The skin is so thin that the contents can be seen through it. The tumor has caused phimosis and balanitis.

Fig. 48 shows a dermoid of the neck in the position of the second branchial arch. Symmetrical dermoids in the middle line may occur above or below the larynx. Dermoids of the floor of the mouth may cause bulging of the sub-mental region. The tumor is the size of a hen's egg, has a smooth surface, is of doughy or semi-fluctuating consistence, movable over subjacent parts and covered by movable, intact skin. It was present since infancy, at first slow-growing, later on stationary, and caused no inconvenience apart from the disfigurement.

It was possible to mistake this tumor for a tuberculous lymphoma, or a thyro-glossal cyst, but the doughy consistence settled the diagnosis. Treated by extirpation.

FIBROMA VAGINAE TENDONIS (*Fibroma of Tendon-Sheath*)

Plate XXXVII, Fig. 49.

Fibroma belongs to the benign connective-tissue tumors, and consists of connective-tissue cells, fibrillar, inter-cellular substance and a variable amount of blood-vessels and lymphatics. When the matrix is hard and abundant, with slight development of spindle-cells, the fibroma is hard, while soft fibroma is formed by spongy tissue with numerous blood-vessels.

Fibromas, which consist of fibrous connective tissue with few nuclei, are also termed desmoids, and occur especially in the fascia of the abdominal walls, while the term fibrosarcoma is applied to tumors which consist of irregularly arranged spindle cells with little intercellular substance, and show degenerative changes and an absence of mature tissue.

Transitional forms from fibroma to fibrosarcoma and sarcoma are especially observed in the tumors occurring in fascia. Mixed forms are often found, such as fibro-lipoma, fibro-myoma, fibro-adenoma and fibro-myxoma. Cystic formation is also seen in fibromas.

Fibromas occur in all situations where fibrillar connective tissue is present—in the cutaneous and subcutaneous tissue (back and thigh), in intermuscular, intertendinous (Fig. 49), submucous and subserous tissue (alimentary canal, uterus, larynx). They may also develop in fasciæ and aponeuroses, nerve sheaths and periosteum (naso-pharyngeal tumors, Fig. 25, and epulis, Fig. 35), and also in the organs.

Fig. 50. Enchondromata manus.

Fig. 49. Fibroma vaginae tendinis.

They form circumscribed tumors of firm consistence and smooth surface, often encapsuled, slow-growing, sessile or pedunculated (fibrolipoma pendulum, Fig. 52). Pedunculated submucous fibromas often occur in the larynx in singers. Fibromas form rounded or polypoid growths, which may occur at any age, but are seldom congenital. After metaplastic changes (ossification) they may become hard tumors.

In the skin and subcutaneous tissue they have a yellowish-white surface (Fig. 49). On section they show stratification and a glistening appearance like tendon.

Differential Diagnosis. Superficial hard fibromas of the skin and subcutaneous tissue are easily recognized by their form, consistence, clear demarcation and solitary appearance. It is only transitional forms between fibrosarcoma and sarcoma that present any difficulty. Deep fibromas which often attain a large size (*e.g.* in the abdominal cavity) are recognized by their nodular surface, hardness and encapsulation.

Treatment. Excision of the tumor with its capsule. For the removal of deep fibromas extensive operations are necessary. Sometimes they are so firmly attached to the neighboring tissues or organs that a portion of the latter must be removed with them.

Fig. 49 shows a fibroma of the sheath of the flexor tendon of the finger, the yellowish-white surface of which shows through the skin. The skin is slightly movable over the hard nodular tumor. The tumor itself is movable over the subjacent structures, and remains unaltered in position on moving the finger. Fibromas of tendon sheaths are rare on the whole, and are due to traumatic causes. The tumor was excised.

After injuries and stretching of tendons similar growths occur, sometimes multiple; they are due to proliferation of the cellular tissue. In *Dupuytren's* contraction (Fig. 60) nodules also develop in the palmar aponeurosis, which have a resemblance to fibromas.

Thickenings which occur in tendons and tendon sheaths, and lock the movements of the fingers in certain positions, are not true fibromas.

CHONDROMA

Plate XXXVII, Fig. 50.

Although cartilaginous tumors are pathologically divided into two groups: (1) ecchondromas, or hyperplastic proliferations from pre-existing cartilage, which only occur in places where cartilage is usually present; (2) heteroplastic cartilaginous growths, or enchondromas, which occur in places where cartilage is not normally present; these two forms are often impossible to distinguish clinically.

We, therefore, include both forms under the name of chondroma. The tumors either consist of the different forms of cartilage, or else they form mixed tumors, such as chondro-myxoma, chondro-lipoma, or chondro-sarcoma. Cystic degeneration may also occur in chondromas, and by liquefaction of cartilaginous tumors large cysts may form in the long bones. True chondromas may occur in the soft parts from aberrant pieces of cartilage in the neighborhood. (Salivary glands, neck, ear, lungs, trachea, mammary gland).

The mixed tumors occurring in the testicles and salivary glands, which develop cartilaginous tissue through metaplasia, are not true chondromas.

Congenital chondromas, and those occurring in infancy, according to *Virchow*, are due to disturbances in the development of bone during the period of growth, and arise from islands of cartilage left in the diaphysis. Rickets appear to play a certain rôle in this connection owing to the irregular ossification of the epiphyseal cartilages. In some cases these appear to be a hereditary tendency to the formation of chondromas.

True chondromas, or enchondromas, develop from the periosteum or medulla, most commonly in the phalanges and metacarpal or metatarsal bones; usually multiple. Isolated chondromas also occur in the upper end of the humerus, the lower end of the radius, the head of the tibia, the pelvic bones and the scapula, often combined with cartilaginous exostoses (ossified ecchondromas with a cartilaginous covering).

Chondromas form slow-growing, hard, nodular, circumscribed tumors, which may cause pressure atrophy of neighboring parts (Fig. 50). Multiple tumors, especially in the hands, cause considerable deformity by disturbance of growth (shortening and twisting). Pathological fracture may occur from destruction of the cortex, in tumors growing from the medullary cavity.

The softer forms of chondroma must be regarded as malignant, because they take on an infiltrating growth, extend to the veins and give rise to metastases. (Chondro-sarcoma).

Differential Diagnosis. Central medullary chondromas have to be diagnosed from osteomyelitic abscesses and from central sarcoma. The former, on X-ray examination, show thickening of the periosteum; the latter can often only be distinguished by operation, as the X-ray appearances are very similar in chondroma and sarcoma (when the chondroma is single). Large chondromas of the head of the tibia or upper end of the humerus are easily recognized by their nodular surface and hard consistence.

Treatment. Isolated chondromas should always be extirpated, as they may develop into sarcoma. Multiple chondromas may be incised and scraped. If rapidly growing recurrence takes place, resection or amputation must be performed.

Fig. 50 shows a case of multiple chondromas of the fingers in a young man, which had been present since childhood. The nodular tumors are situated in the phalanges and metacarpal bones, and have caused thinning and reddening of the skin by pressure. The X-rays showed the origin to be in the medullary cavity. The tumors on the first, second and fourth fingers were incised and scraped. The little finger was removed with its metacarpal bone, on account of the multiplicity of the tumors.

HEMORRHOIDES ET FIBROMATA ANI

(*Hemorrhoids and Fibromas of Anus*)

Plate XXXVIII, Fig. 51.

Among the benign growths of the anus, hemorrhoids are the most common. According to the latest researches these must be regarded not only as varicose veins, but as vascular growths or angiomas. Hemorrhoids are called external or internal, according as they are situated in the anus or rectum.

External hemorrhoids are due to the formation of new blood-vessels and dilatation of the veins of the inferior hemorrhoidal plexus. Certain races seem to be predisposed to this affection; constipation and pelvic engorgement may also give rise to it.

These subcutaneous hemorrhoids form bluish, compressible, nodular, sessile growths covered by thin skin, and situated around the anal orifice. There is often moist eczema in the neighborhood (Fig. 51). Through eczema and ulceration the nodules may be transformed into fibrous structures (Fig. 51). In their inflammatory state they cause much itching and pain with tenesmus; while the nodules become hard from thrombophlebitis, and bleed easily. Multiple internal hemorrhoids of the lower part of the rectum bleed easily without becoming inflamed, and have a tendency to prolapse. When they are situated higher up the rectum, diagnosis can be made by digital examination or by the rectoscope.

Differential Diagnosis. External hemorrhoids may be confounded with condylomata acuminata, which are common round the anus in women suffering with gonorrhea. These are often as thick as the

Fig. 51. Hämorrhoides et Fibromata ani.

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finger, and form similar cockscomb growths on account of their papillomatous structure. Fibromas are rare, generally smaller, pedunculated and solitary.

Carcinomas, of the papillomatous type, are recognized by their rapid growth, inguinal glandular metastases, early ulceration with hard borders, and irregular boundaries. In all cases of hemorrhoids the rectum should be digitally explored for carcinoma.

Treatment. Laxatives should be given to create soft stools, and the anus should be washed after defecation. During an attack, rest in bed with the pelvis raised and the introduction of pessaries are useful. Suppurating hemorrhoids must be incised. In cases with frequent hemorrhages and severe pain, a radical operation is indicated, either by cautery or by excision of the nodules with subsequent suture.

Fibromas and condylomas can be removed by scissors, while carcinoma requires more extensive operative interference.

Fig. 51 shows moist eczema in the region of the anus. Round the anus are yellowish, nodular, hemorrhoidal growths, which have a resemblance to fibromas on account of inflammatory changes and ulceration. In one place is a bluish, glistening nodule covered by thin skin. The growths were removed by the thermo-cautery.

Lipoma

FIBROLIPOMA PENDULUM SUBCUTANEUM
(*Pendulous Fibrolipoma*)
Plate XXXIX, Fig. 52.

LIPOMA DIFFUSUM SUBCUTANEUM
(*Diffuse Subcutaneous Lipoma*)
Plate XL, Fig. 53.

LIPOMATA SYMMETRICA SUBCUTANEA
(*Symmetrical Subcutaneous Lipomata*)
Plate XLI, Fig. 54.

Lipomas are tumors formed of fatty tissue, and have, therefore, the yellowish-white color, soft consistence, and lobular structure of fatty tissue. The individual fat lobules are separated by more or less strongly developed connective-tissue septa, and the whole tumor is demarcated from the surrounding tissues by a thin capsule. Lipomas are of soft consistence, often with pseudo-fluctuation; in rare cases harder, from the development of more connective tissue. They are slow-growing globular tumors, which sometimes attain an enormous size, and are usually supplied by a single vessel at the base of the tumor. At the base of the larger tumors the skin is generally drawn out into a pedicle, and is often œdematous. Lipomas are essentially benign tumors; they do not recur or give rise to metastases, nor do they become transformed into malignant tumors. Besides the fatty tissue, other tissues may be developed (fibro-lipoma, myxo-lipoma, angio-lipoma, chondro-lipoma). Cystic degeneration may give rise to so-called oil-cysts in the interior of lipomas.

Multiple, usually symmetrical lipomas, are due to disturbances in development. They may be

Fig. 52. Fibrolipoma subcutaneum pendulum.

connected with nerves (multiple lipomas are often painful) or with lymphatic glands, which have been found in multiple lipomas. Congenital lipoma is found especially in spina bifida, which arises as a myelo-cystocele, and usually as a myxolipoma (Fig. 144). That lipomas are true tumors is shown by their persistence in severe emaciation. Long-continued pressure on a lipoma may cause suppuration of the fatty tumor through ulceration of the skin.

That chronic irritation plays a part in the development of lipomas is shown by the occurrence of these tumors on the backs of carriers, and on the foreheads of persons who wear hard hats. Middle-aged women are especially affected by these tumors, which may grow considerably during pregnancy.

Lipomas are most often found in the subcutaneous tissue (Figs. 52, 53 and 54), where they appear as soft, encapsuled tumors with a lobulated surface, covered by non-adherent skin. The skin over the tumor becomes dimpled when pinched up, owing to its connection with the tumor by connective tissue (Fig. 53). The seats of predilection for subcutaneous lipomas are the back, nape of the neck, axilla, shoulder, upper arm, thigh, buttocks and scrotum.

Sub-fascial lipomas are very rare. They may occur under the fascia of the forehead (where they may be mistaken for dermoids) and under the palmar fascia. Intermuscular lipomas occur behind the pectoralis major and in the tongue. In the knee joint arborescent lipoma occurs, which has the typical structure of fatty tissue. Lipomas may also arise from the sub-mucous and sub-serous tissue (gut and larynx); sub-peritoneal lipomas may give rise to hernia through the linea alba. Sub-serous lipomas also sometimes appear in the inguinal and femoral canals; in the omentum and mesentery; in the retroperitoneal tissue, and in the glandular organs (breast and kidney).

All lipomas, especially sub-cutaneous, sub-fascial

and intermuscular, have a tendency to send processes into the surrounding parts.

Differential Diagnosis. Superficial lipomas are distinguished from fibromas, lymphomas, dermoids, sebaceous cysts, hygromas and other tumors by their lobular surface and the puckering of the skin. When they cannot be palpated, lipomas cannot always be distinguished from other tumors.

Treatment. Incision through the skin and removal of the tumor with its processes.

Diffuse lipomas, which consist in an infiltration of the sub-cutaneous tissue with fatty masses without any capsule, are not to be regarded as true tumors (lipomatosis of *Billroth*). In the neck they may be dangerous from pressure on the larynx, so that removal is necessary, although this must generally be incomplete. The fatty masses may also be made to shrink by the injection of alcohol and ether.

Fig. 52 shows a pendulous fibro-lipoma in a middle-aged woman. The skin is somewhat reddened, but non-adherent. The surface of the tumor is smooth, the consistence moderately hard. The tumor is movable over the fascia. The base of the tumor is broad, on account of its small size. The tumor was removed by an oval incision and suture.

Fig. 53 shows a sub-cutaneous lipoma the size of the fist in a common situation in a middle-aged woman. The puckering of the skin is clearly seen. These puckerings (white spots in the figure) are also found in the breast, and are due to processes of the lipoma extending into the breast. The tumor with its processes was extirpated.

Fig. 54 shows symmetrical lipomas in the region of both parotids, in the upper eyelids, and in various parts of the neck (both sides of sub-maxillary region and in sub-lingual region) in an old man. The pain-

Fig. 53. Lipoma diffusum subcutaneum.

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Fig. 54. Lipomata subcutanea symmetrica.

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less tumors had not increased in size for some years. Their lobular surface and their consistence distinguish these solid tumors from symmetrical cystic formations in the salivary glands, which cause similar swellings in the face and neck. The disease is distinguished from lipomatosis by consisting of multiple, separate, encapsuled tumors. There were no other lipomas in other parts (in distinction to cases in which lipomas occur over the whole body). The tumors were removed at several sittings.

GRANULATIONES ET TRANSPLANTATIONES

(Granulations and Skin Grafting)

Plate XLII, Fig. 55.

This plate shows a granulating wound of the right breast, left after extirpation of the mammary gland. After extirpation of the breast, an attempt should be made to close the wound by sutures, but these should not be tied too tightly, especially in the center of the wound, as they are liable to tear through the tissues and cause sloughing. The figure shows the reddish-brown holes of the sutures, which have led to partial closure of the wound in the center. The remainder of the wound can be left to heal by granulation, and *Thiersch's* grafts may be applied. The surface of the wound must first be cleansed, and the granulations must be bright red and exuberant (Fig. 55). Moist dressings of 3 per cent. boric acid lotion and 2 per cent. acetic alum are then applied. The figure shows three epidermic grafts which have become attached to the red granulations. On the axillary side the granulations are still yellowish, and are not yet ready for grafting.

When the whole surface of the wound is covered with red, exuberant granulations, these are removed with a scalpel, and the bleeding surface compressed with hot compresses soaked in saline solution; the largest possible epidermic grafts are then applied and covered with iodoform gauze and plaster. The figure also shows the appearance of such granulations as they occur in the course of the undisturbed wound.

Fig. 55. Granulationes et Transplantationes.

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Fig. 56. Fistula ex corpore alieno.

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FISTULA EX CORPORE ALIENO (*Fistula from foreign bodies*)

Plate XLIII, Fig. 56.

As the result of incision of a paranephritic abscess, a fistula has remained, which, in spite of drainage, tamponage and repeated scraping, has not healed. The surrounding skin is inflamed and œdematous. The granulations at the opening of the fistula are unhealthy, dirty-brown and purulent. Shreds of tissue with a fetid odor are discharged from the fistula.

Such an appearance of the fistula and its surroundings is typical of all cases where, either the external opening is too small, so that an abscess in connection with it is not sufficiently drained, or where necrosed pieces of tissue in the deeper parts are cast off and act as foreign bodies (*e.g.* bony sequestra in coxitis, etc. (Figs. 95 and 96). Similar fistulas, with an offensive sanious discharge, sometimes result from tampons, drains, or instruments being left behind after operations.

In pyogenic lesions which have been insufficiently incised, the presence of unhealthy, purulent granulations shows that the pus has not a free outlet, or that the lesion is extending. When a local pyogenic lesion gives rise to general pyæmia the wound shows similar changes, but the granulations besides having a dirty-yellow appearance are quite dry.

Treatment must be directed to the cause of the fistula. The latter should be laid open freely, and foreign bodies or pieces of necrosed bone removed, after which healing will take place.

In the case represented in Fig. 56, the kidney was found to be almost completely destroyed by suppuration. Healing quickly took place after removal of the kidney.

FISTULA COLLI MEDIANA (*Median Fistula of the Neck*)

Plate XLIV, Fig. 57.

Median fistula of the neck is due to the persistence of the thyro-glossal duct, which in embryonic life leads from the foramen cæcum at the back of the tongue to the middle lobe of the thyroid gland. Lateral fistulæ of the neck are due to imperfect closure of the second branchial cleft.

The lateral fistulæ may also open in the middle line, so that their true nature can only be made out by tracing their course. This can be done by palpation, by the passage of a probe, or by injection of milk. The lateral fistulæ of the neck deviate from the middle line, perforate the superficial fascia of the neck parallel to the sterno-mastoid muscle behind the greater cornu of the hyoid bone, and open into the side of the pharynx near the tonsil, while the course of median fistulæ remains in the middle line, passing behind or through the hyoid bone to the base of the tongue, and opening at the foramen cæcum. If the internal opening of a fistula is open and the outer opening closed, it is an internal incomplete fistula; if the outer opening is open but the inner one closed, it is an external incomplete fistula. If both openings are closed, branchial cysts are formed in the case of lateral fistulæ, and median cysts (from the thyro-glossal duct) in the case of median fistula.

Median fistula of the neck (Fig. 57), although of congenital origin, is not usually noticed for several years, for it is formed by an internal incomplete fistula which gradually perforates the skin of the neck. The fistula generally opens in the middle line

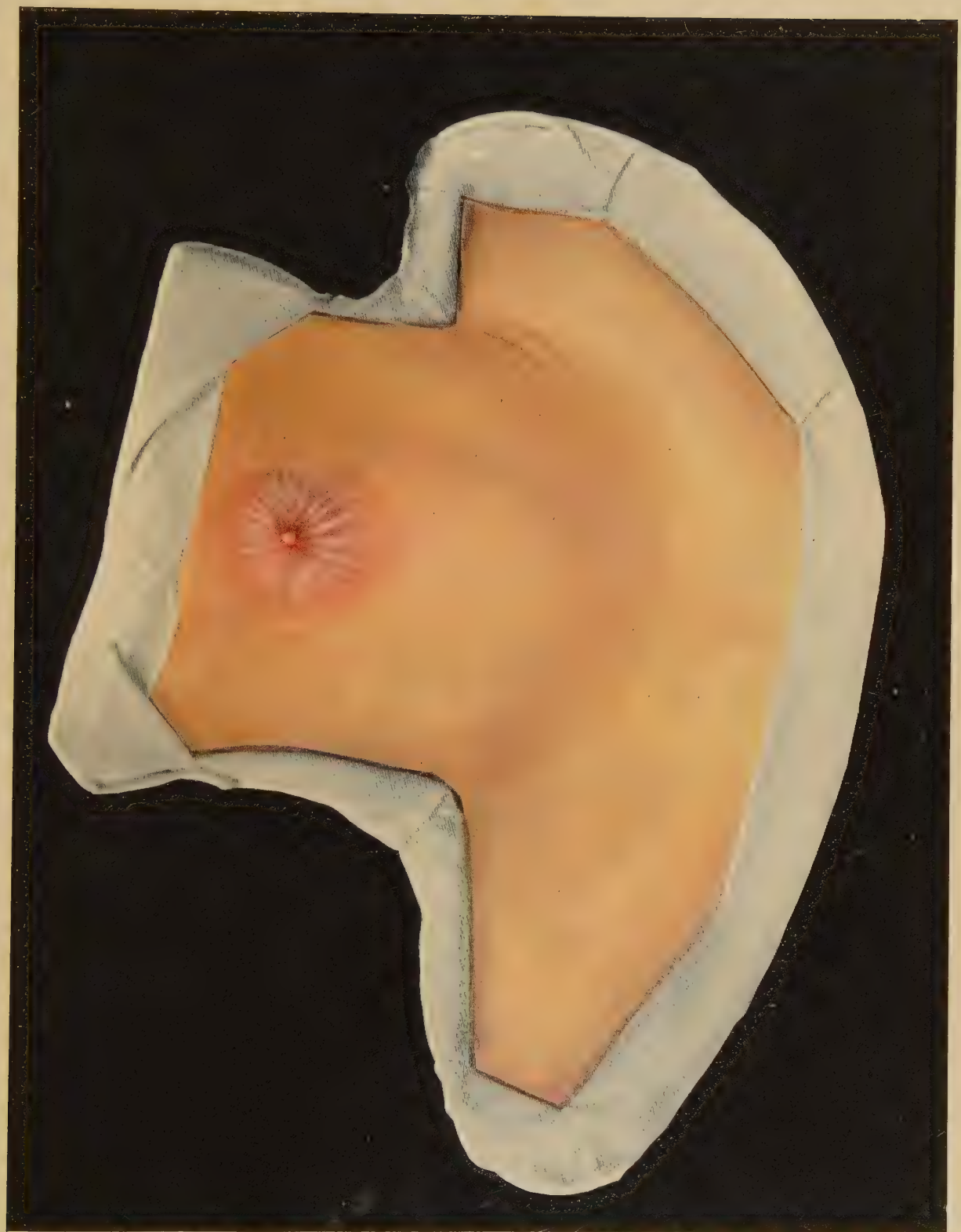

Fig. 57. Fistula colli mediana.

between the hyoid bone and the sternum, and is characterized by certain signs which are also found in lateral fistula which opens on the inner border of the sterno-mastoid muscle. The latter are more often congenital. In both cases there is a small button-shaped opening, which is sometimes glued together, sometimes discharges a drop of clear whitish fluid. There are regularly arranged radiating cicatrices round the fistula. If there is much secretion the skin may be eczematous. On palpation, a hard cord, as thick as a quill pen, can be felt passing towards the middle line or laterally, according to the nature of the fistula. Above the hyoid bone the cord cannot be felt. The direction of the fistula is shown better by probing; the probe can hardly ever be passed beyond the hyoid bone. However, if milk is injected it can be seen to flow out near the tonsil in the case of lateral fistula, and at the foramen cæcum at the base of the tongue in the case of median fistula.

Narrow fistulas cause little trouble to the patient, but in wide, lateral fistulas accumulation of food may cause inflammation and abscess. Carcinoma may arise from fistulas and cysts of the neck; it is called branchiogenous, as it is derived from the epithelium of the branchial clefts.

Differential Diagnosis. Fistulas arising from tuberculous or inflammatory processes differ both in their external appearance and in the course of the fistulous track. In doubtful cases microscopic examination may be made.

Treatment. Injections with the object of causing obliteration of the fistula are useless. The only rational treatment is total extirpation of the fistula through a long incision, bearing in mind the anatomy of the parts. In lateral fistula it is best to remove the internal orifice together with the tonsil. In median fistula, it is sometimes necessary to remove

the middle part of the hyoid bone, in order to follow the track to the foramen cæcum. Recurrence is frequent if the smallest part of the fistulous track is left behind. Microscopic examination of both median and lateral fistulas shows squamous epithelium in distal sections, cylindrical epithelium in proximal sections. The presence of lymphoid tissue in the wall of the fistula is characteristic.

Fig. 57 shows a median fistula of the neck in a girl aged nineteen. The fistula first appeared at the age of fifteen, and was treated by injection and incision, without any result. A drop of secretion is seen at the orifice of the fistula. Radiating cicatrices are also visible. The fistulous track could be felt as a cord as far as the hyoid bone, but its further course could not be made out by injection of fluid. The foramen cæcum was deep. After an incision round the opening of the fistula together with the scar tissue, the track was dissected out. The center of the hyoid bone, through which the track penetrated, was removed, so as to continue the extirpation to the base of the tongue. Microscopic examination showed squamous epithelium in the lower part of the fistula and ciliated, cylindrical epithelium in the upper part.

Fig. 59. Keloide post laparotomiam.

Fig. 58. Keloide post vaccinationem.

Keloid

Plate XLV.

KELOID POST VACCINATIONEM (*Keloid after Vaccination*)
Fig. 58.
KELOID POST LAPAROTOMIAM (*Keloid after Laparotomy*)
Fig. 59.

This disease, the etiology of which is still obscure, consists in the formation of homogenous, fibrous tumors in the skin which are formed of hypertrophic scar tissue with thickened blood-vessels. The chief part of the growth consists of dense, hyaline, often interlacing bundles of connective tissue, while cells and elastic fibers are few in number. Only a few cases can be spoken of as true tumors.

The papillary bodies are unchanged, but lying under them are nodules or lamellæ, more or less rich in cells (keloid-nodular cancer). In the lamellar form (Fig. 58) there are radial processes at the periphery which are often prolonged as fine processes into the skin. The keloid presents itself as a tumor of hard consistence, with a smooth, glistening surface, of reddish (Fig. 58) or yellowish-white color (Fig. 59), situated in the skin and movable over subjacent structures. Keloids are painless, of slow growth, and then remain the same size for some time. They are common in young women. Pain and irritation may be caused by pressure on the tumors, especially when they are of large size, or situated in places exposed to frequent pressure or contact.

It is now believed that keloids occur exclusively after injuries (operations, vaccination, scars caused by flagellation, burns, chronic ulcers, etc.), and that

there is a local or general disposition to keloid formation in the individual affected. It has not been proved that infected wounds are more liable to form keloids. Certain parts of the body are more affected than others—the shoulders, face, abdomen and external ears—while the extremities are seldom affected. Dark races have a special tendency to keloid formation.

Glandular enlargement and metastases are not observed, but large keloids may ulcerate, and cancer may develop from the ulcers.

Differential Diagnosis. Hypertrophic scars may be mistaken for incompletely developed keloids, but the former are usually very sensitive, are not so extensive as keloid, occur especially after infected wounds, and nearly always undergo partial resolution after some years.

Treatment. Operation is to be avoided, as recurrence nearly always takes place after extirpation, with or without a plastic operation, after cauterization and scraping, and the recurrent growth is often more extensive than the original. Electrolysis, or injection of a 10 per cent. solution of thiosinamin sometimes cause improvement.

Fig. 58 shows a keloid in a young girl, which arose from a vaccination scar and recurred extensively after extirpation. An extensive flat growth is seen with radiating processes; also smaller nodular growths in the neighborhood.

Fig. 59 shows an extensive nodular keloid in a woman of twenty, which developed in the scar of a laparotomy. At each suture hole a nodule has developed. At the lower part are hard, cauliflower nodules, freely movable and covered by epidermis. Injection of thiosinamin solution into the nodules caused partial disintegration, but later on further recurrence took place in the parts treated.

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